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SUMMARY OF RECENT ABSTRACTS *

V. LEISHMANIASIS †

VISCERAL LEISHMANIASIS

Old World

Localized leishmanial infection of lymph nodes, without general visceral dissemination, is exceedingly rare, but BELL *et al.* (p. 875) report 1 probable and 3 certain cases in British soldiers who had been stationed in Malta. Sternal marrow was normal and there was no evidence of the infection except in cervical, axillary, inguinal or femoral glands, in which leishmaniae were demonstrated in the 3 certain cases, though attempts at cultivation were unsuccessful. Treatment with sodium stibogluconate was followed by subsidence of the glandular enlargement. In comment Walters remarks that the condition may be more common than is supposed.

In Serbia SIMITCH *et al.* (p. 876) detected infection with *L. donovani* in 3 dogs which had shown no evidence of the disease, by inoculating suspensions of liver and spleen into the ground squirrel. By intraperitoneal inoculation of infected material they confirmed the fact that though some infected dogs show signs of illness, sometimes severe, a few remain symptomless, though infected, and proceed to spontaneous cure. A focus of leishmaniasis in children is described by GHERMAN *et al.* (p. 1093) for the first time in part of Rumania; only 1 patient (out of 24) lived in good hygienic and social surroundings.

SEN GUPTA (p. 263) reports an increase in the number of patients with kala azar and with post-kala-azar dermal leishmaniasis treated at the Calcutta School of Tropical Medicine in recent years. The interval between the febrile attack and the first appearance of the dermal lesions varied from less than 1 year to over 5. He describes the clinical appearances, and for treatment he recommends the pentavalent antimonials, but notes that the course of treatment may need to be very long. He gave 20–50 injections, with a cure rate of just over 50%.

LEWIS and KIRK (p. 1209) give an account of some species of *Phlebotomus*

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1958, v. 55. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on leishmaniasis in this series, see the June issues of the *Tropical Diseases Bulletin* each year since 1939.

in the Sudan. *P. orientalis,* probably a vector, was found in a notorious focus of kala azar now abandoned on account of the disease. A description of the fine structure of the flagellum of *L. donovani* as revealed by electron microscopy is given by INOKI *et al.* (p. 743).

SMITH and WEISS (p. 1369) describe studies of the bone marrow in Sudanese subjects examined in a survey for kala azar. They think that the anaemia in kala azar is due to excessive blood destruction in the grossly enlarged spleen. Filter-paper electrophoresis of serum proteins in kala azar shows a marked increase in gamma globulin and a decrease in albumin, but KUMAR *et al.* (p. 1312) state that the different protein fractions do not bear any relationship to the intensity of a positive aldehyde test.

A complement-fixation test with Kedrowsky's bacillus as antigen has proved useful in the diagnosis of kala azar; MONSUR and KHALEQUE (p. 744) describe the preparation of a purified antigen. The test was used by NUSSENZWEIG (p. 993), who found it very sensitive in South American kala azar; it is not specific, however, since positive results were also obtained in tuberculosis, leprosy and cutaneous leishmaniasis, and in Chagas's disease. With his colleagues (p. 994), however, he found it more sensitive for the diagnosis of canine kala azar than skin or liver biopsy. It was negative in 65 of 67 dogs from a non-endemic area. NUSSENZWEIG *et al.* (p. 1313) used it on dogs, finding 50 positive in 209 tested; most of the dogs were clinically normal. The complement-fixation titres were especially high in dogs in which the parasite was found.

New World

PRATA (p. 262) has published a monograph on the clinical and laboratory aspects of kala azar.

In a focus of kala azar in part of Brazil VIANA MARTINS *et al.* (p. 1210) remark that *P. longipalpis* seems to be the most important vector. DEANE (p. 262) has published a monograph on visceral leishmaniasis in Brazil. He notes that the vertebrate hosts include the dog and the fox, and that although 14 species of *Phlebotomus* were captured, *P. longipalpis* is the sole important vector in Ceará. He discusses the transmission of the disease in Brazil as a whole. An account of the 5 species of *Phlebotomus* which bite man in the endemic leishmaniasis area of Surinam is given by BRUIJNING (p. 261); they include *P. intermedius,* a proved vector of leishmaniasis.

Leishmaniae were found by PRATA and PIVA (p. 141) in apparently normal skin of one patient with visceral leishmaniasis; the authors comment on the epidemiological importance of this finding.

PRATA (p. 263) in Brazil achieved clinical cure in a few patients with kala azar by using glucantime, lomidine and Pentostam in various combinations or alone.

CUTANEOUS LEISHMANIASIS

ANDRÉ *et al.* (p. 379) report a case of cutaneous leishmaniasis and another of cutaneous-glandular leishmaniasis in persons who had spent a holiday in northern Spain and southern France. In the second case the affected glands in the carotid region were not associated with skin lesions. This patient, shortly before diagnosis, had given blood to 2 newborn infants, one of whom later developed visceral leishmaniasis which responded to treatment. The skin lesions in the first 2 patients were mild, and disappeared in one without treatment, and

the authors suggest that these minimal lesions may easily be overlooked. They also remark that visceral disease in the infant apparently arose from the blood transfusion from a donor with leishmaniasis of a different kind.

LIPPI (p. 381) gives an account of visceral and cutaneous leishmaniasis and their distribution in Italy. The visceral disease is most common in the south and in the islands, and the cutaneous form in the Adriatic coastal region. Notifications of each have fallen very greatly in recent years, probably as a result of the use of DDT and other insecticides. WOO and REIMANN (p. 382) found leishman bodies in a section of skin from a nodule on the chin of a girl who had come to the United States from Italy a year earlier; at first they were mistaken for histoplasms. In comment Napier suggested that this may have been a case of post-kala-azar dermal leishmaniasis rather than of the cutaneous disease.

Cutaneous leishmaniasis appears to be common in the Chad region where PIRAME and BECQUET (p. 1313) found 7 cases in 10 weeks. Treatment with glucantime was well tolerated and was successful.

MCMILLAN (p. 382) describes a case of cutaneous leishmaniasis in a European in Northern Nigeria, but he probably contracted it in the Persian Gulf.

AMERICAN LEISHMANIASIS

A monograph on the American forms of leishmaniasis, which deals with epidemiological and clinical features, has been published by LEON (p. 261).

BIAGI *et al.* (p. 877) describe a new focus of cutaneous leishmaniasis, with ulcerating subcutaneous nodules on the pinna of the ear, in Mexico. The Montenegro reaction was positive and leishmaniae were demonstrated in several patients studied fully. In patients with cutaneous leishmaniasis in Mexico MARROQUIN and BIAGI (p. 744) found chronic non-specific inflammatory lesions only, and comment that the demonstration of the parasites is the only specific element which permits histopathological diagnosis.

FLOCH (p. 640) describes American forest leishmaniasis (due to *L. brasiliensis*) as seen in French Guiana, where it is a minor scourge, particularly for mining and prospecting expeditions. Of 4 man-biting species of *Phlebotomus* only *P. anduzei* appears probably to be a natural vector, but as it is a forest species it is not affected by house-spraying campaigns, though DDT, BHC and dieldrin can be used effectively on probable breeding places. The sandflies have a small range of flight and it is necessary to treat only a radius of 250 yards round the point to be protected. Known and suspected animal hosts are discussed.

FORRATINI and DE OLIVEIRA (p. 1094) report a hitherto unknown focus of cutaneous leishmaniasis in Brazil. VIANA MARTINS *et al.* (p. 1210) found the intradermal test with *L. brasiliensis* antigens positive in 21 of 157 unselected persons in a focus of cutaneous leishmaniasis in Brazil.

BAKER and GUTIÉRREZ BALLESTEROS (p. 1314) used the vapour-heat process for the treatment of ear lesions due to *L. brasiliensis*. It was successful and the ulcers cicatrized. The technique is not described in detail but appears to be the application of saturated steam to the anaesthetized part; it makes use of latent heat. It was first used to destroy insect larvae in the interior of fruit without damaging the fruit itself.

There has been a remarkable fall in the incidence of leishmaniasis of the skin in dogs in the Canchacalla Valley, Peru, and this is regarded by HERRER (p. 21) as a result of the domestic use of insecticides, since no regular programmes of

insect eradication have been carried out in that valley by official or private organizations. In a district of Peru DDT was applied in 1947–48 to the stone walls within the town and in the adjacent fields, but not in human dwellings, and HERRER (p. 149) reports that 2 years later the incidence of cutaneous leishmaniasis in dogs had decreased from 22·0 to 1·6%. The incidence of cutaneous leishmaniasis in children, and also of verruga peruana, decreased so greatly during 6 years after the first use of the insecticide as to suggest that transmission had ceased. The population of *Phlebotomus verrucarum* decreased in all human dwellings examined in this period, and the population of *P. noguchii* in neighbouring caves also decreased, but probably rather as a result of disappearance of rodent hosts than of the effects of DDT on the neighbouring stone walls. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

EAST AFRICA HIGH COMMISSION. **Annual Report of the East African Institute of Malaria and Vector-Borne Diseases, July 1957–June 1958** [WILSON, D. Bagster, Director]. 24 pp., 4 figs. (2 coloured) on 4 pls. 1958. Dar es Salaam: Govt. Printer. [Shs. 3/–.]

Entomological studies include notes on the recapture of 500 out of 50,000 marked female anophelines liberated from 4 release points, from which it is concluded that under the local conditions the distribution of *Anopheles gambiae* is random as regards direction and restricted in range. Evidence was also gathered from this experiment on the relationship between mortality rate and age, the two appearing to be substantially independent so far as the present material shows. Trials with the new Russian technique for age analysis of mosquitoes by enumeration of the corpora lutea has so far not proved rewarding, the technique is exacting and has not yet been fully mastered, while observation of mosquitoes of known age and parity have not always supported the accuracy of the technique. Reports on anopheline studies in the Taveta Pare Control Scheme give information on their reduction in treated houses, their infectivity (1 sporozoite-infected specimen of 9,862 *A. gambiae* dissected, and this from a marginal area), their choice of host as shown by precipitin tests, their numbers outdoors which indicate that a great reduction in the actual anopheline population has been maintained, and on the presence of members of the *A. funestus* group. The type form had disappeared, being replaced by *A. rivulorum*, but which is now again being replaced by *funestus*-like adults differing slightly from the type form. There has been no change in the susceptibility of *A. gambiae* to dieldrin, but bedbugs and *Culex fatigans* are firmly resistant. Blood examination of the human population of the treated area demonstrates the continuation of infection on a low scale, the parasite rates in infants lying between 2 and 4% (which can be compared with 89% in the comparison area) and it is clear that not all of this can be explained by migration. The actual mechanism of this low level transmission has not been demonstrated. A significant increase in the

haemoglobin levels of residents in treated areas is recorded together with some slight increase in the weights of infants and children. On the fifth round of spraying with dieldrin 0·5 gm. per sq. metre it was found that large numbers of houses (19% in one area) had been constructed since the last application and were therefore untreated resting places. A careful analysis was made of the working day of spray staff and of the degree of contamination of clothing and skin, it being calculated that each spray-man in an average day received a skin contamination of about 1·8 mgm. dieldrin per kgm. body weight. However, no individual has at any time suffered even minor ill effects and this is attributed partly to the careful use of protective clothing and to the liberal issue of soap which made a good level of personal cleanliness possible. Additional notes are given on a comparison of larvicidal action of DDT solutions in oil with and without spreading agents, there being found to be little difference; on the serum protein pattern in infants which was found to resemble that of normal European adults; on the species of flies recovered from Zanzibar; on anophelines in Aden Protectorate, and on the prevention of malaria by engineering methods.

G. Macdonald

Ho, Ch'i & Feng, Lan-Chou. [Compiled by.] **Studies on Malaria in New China.** *Chinese Med. J.* Peking. 1958, Dec., v. 77, No. 6, 533–51.

As a part of the present "leap forward" policy of the People's Republic of China, the time limit for the fundamental extermination of malaria has been advanced from 1963 to 1960, and, to help in its achievement, knowledge on the epidemiology and means of controlling the disease in China is here brought together with special emphasis on recent researches. The distribution of the disease is reviewed under a new and interesting classification. China may be considered in 4 zones, the dividing lines between which are degrees of latitude 25°N., 32°N. and 45°N. *Anopheles hyrcanus sinensis,* an inefficient vector with usually a very low natural infectivity rate, occurs in all of these zones but otherwise the two northernmost are characterized by palaearctic fauna and the 2 southernmost by oriental fauna. *A. m. atroparvus* and *A. m. messeae* occur in the northernmost, which however includes only a very few mildly malarious foci. In the next area, *A. pattoni* is the principal vector though *A. m. atroparvus* and *A. m. messeae* also occur. *Plasmodium vivax* is the principal and almost the only parasite and the disease is seasonal and discontinuous in its distribution. In the region between 25°N. and 32°N. *A. minimus, A. fluviatilis* and *A. jeyporiensis candidiensis* act as vectors in the hill areas where they maintain a fairly intense *P. falciparum* malaria for 6 or 7 months a year, while a moderate endemicity or epidemicity is maintained in the plains by *A. hyrcanus sinensis.* In the southernmost area the vectors of the previous one are reinforced by *A. leucosphyrus* in wooded areas of Hainan Island and by *A. ludlowi* [*sic*] in parts of Taiwan. Malaria is holoendemic and stable, local epidemics being unknown, though they may happen among immigrants.

The 43 anopheline species recorded from China are listed with accounts of resting habits, feeding habits, nocturnal activity and natural infection rates of the most important. Malariometric data are given concerning each of the various degrees of endemicity encountered, together with outlines of 4 epidemics to illustrate the common types—those due to war, the return of people from more malarious southern regions, unusual increase in the density of the vector,

the mixture of immunes and non-immunes in a sub-tropical area, and the presence of members of a youth reclamation corps working in a malarious area.

Systematic experiments have been made on the values of chloroquine, proguanil, mepacrine, pamaquine, a Soviet preparation AP (mepacrine, 0·1 gm., pamaquine, 0·02 gm.), cyclo-chlorguanide (a metabolic product of proguanil), primaquine, Ch'ang Shan (a traditional drug which caused parasites to disappear in 2–10 days) and acupuncture. This last is a heritage of traditional medicine, in which tremendous progress has now been made, for the treatment of various diseases and which results in the disappearance of clinical symptoms after 1–3 applications in most cases of malaria; in 22 patients with positive smear the parasites disappeared after 1–4 treatments. There are, however, reasons for considering acupuncture to be of limited value in mass malaria control.

Both DDT and BHC appear to be in use and the latter apparently often as a larvicide in rice fields. Experiments have been carried out on larval control in areas affected by *A. minimus* without great success, and in the use of residual insecticides in Hainan where *A. minimus* disappeared almost entirely for 2 years after a single application. However, gland-infected specimens of *A. leucosphyrus* were caught inside the experimental area and a few infections continued throughout it. Another experiment concerned the application of chemoprophylaxis to a group of immigrants, then the addition of chemotherapy and imagicidal attack, and then the protection of the neighbouring population, the combined measures giving very satisfactory results. An account of a fourth experiment details the very great reduction but not the elimination of malaria in a holoendemic area influenced principally by *A. minimus* and *A. fluviatilis*. However, there was some residual malaria and this is attributed to the continued transmission by exophilic *A. leucosphyrus* and *A. jeyporiensis candidiensis* and there is also the risk of getting infection from outside the protected zone.

[This is a valuable summary of the epidemiology of malaria in China. It is tantalizing in that it refers confidently to the expected elimination of malaria by 1960, but never specifically indicates or advocates that emphasis should be placed on any particular method of control, chemotherapy, chemoprophylaxis, imagicidal and larvicidal attack all being mentioned, with no preference shown for any. This copy of the journal contains, besides interesting scientific matter, much political material and it is clearly laid down (p. 527) by the Vice-Minister of Public Health that it is a bourgeois error to emphasize one aspect of control and that the treatment of malaria, elimination of mosquitoes, use of preventive drugs and improvement of environmental hygiene must all be carried out simultaneously if this error is to be avoided. There are many other directives on the lines of thought appropriate to the times, which include emphasis both on the search for new drugs and also on popularization of the practice of acupuncture and traditional Chinese medicine as a whole (p. 531). Included among the outstanding achievements in health work in 1958 is the fact that practically all western-style doctors in Shantung province have learned acupuncture (p. 583) and the 3 book announcements at the end of the journal all refer to text-books of acupuncture and moxibustion, which is cauterization with a vegetable product.] *G. Macdonald*

See also p. 665, GILLIES, **A Simple Autoradiographic Method for distinguishing Insects labelled with Phosphorus-32 and Sulphur-35.**

MUIRHEAD-THOMSON, R. C. **A Pit Shelter for Sampling Outdoor Mosquito Populations.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 1116–18.

The difficulty of finding anopheline mosquitoes indoors where spraying with residual insecticides has been carried out has emphasized interest in the mosquito population resting out-of-doors, and in means of catching useful numbers for study. Reference is made to various methods—earth-lined shelters, box shelters, portable cages, small earth tunnels and direct hand catches from vegetation—which have at least for some species in certain circumstances been useful. This note describes a pit shelter which has given good catches of *Anopheles gambiae* and the *A. funestus* group and some other species in Southern Rhodesia. The pit is 5–6 ft. deep and 4–5 ft. long by 3–4 ft. wide. In each side a cavity about 1 ft. deep is dug out; its roof is horizontal. It is important that the pit be shaded by a tree, bush or thatch awning in the absence of natural shade. The mosquitoes are found at rest by day in the small cavities. This method is now routine in the malaria assessment work in progress in Southern Rhodesia; means of improving its efficiency further are also being studied.

[See also BÜTTIKER below.] *D. S. Bertram*

BÜTTIKER, W. **Notes on Exophily in Anophelines in South-East Asia.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 1118–23. [Refs. in footnotes.]

Outdoor-resting mosquitoes, and methods tried for finding and catching them, during short periods in Ceylon and Burma, are briefly described. Previous work is reviewed. Temporary shelters and huts in Ceylon, often not sprayed at once, are constructed in connexion with agricultural and forestry activities. Mosquitoes rest in these. Catches were by pyrethrin space-spray and floor sheet, the structures being mosquito-proofed by covering with cotton sheeting. For tree-holes with entries near the bottom of trees and the cavity extending inwards and upwards, and also for the burrows of kingfishers, sand martins and bee-eaters in river banks, white paper or cotton was placed along the floor and, after spraying inside with a mist of 2% pyrethrum and kerosene, the entry was sealed for some minutes. Only a few culicines were taken from the birds' nests but tree-holes, in Ceylon particularly, were quite productive; an average of 2 *A. culicifacies* per hole resulted. From this, it is noted, an estimate of 10,000 mosquitoes per sq. km., in the dry season, can be computed for forest areas. Introduction of mosquito repellent into termite heaps in Ceylon yielded only a few culicines. Certain riverine vegetation in Ceylon was space-sprayed, with cotton cloth laid over it and a ground cloth also, but with little result; rock-caves were unproductive by space-spray and by direct search. It is thought that temporary shelters, and tree-holes near human centres, may be sources of infective malaria vectors.

[See also MUIRHEAD-THOMSON above.] *D. S. Bertram*

RISHIKESH, N. **Morphology and Development of the Salivary Glands and their Chromosomes in the Larvae of *Anopheles stephensi* sensu stricto.** *Bull. World Health Organization.* Geneva. 1959, v. 20, No. 1, 47–61, 6 figs. & 4 pls. [48 refs.]

RAPER, A. B. **Further Observations on Sickling and Malaria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Jan., v. 53, No. 1, 110–17, 1 fig. [20 refs.]

There is now general agreement that sickle-cell trait carriers are protected against heavy infection by *Plasmodium falciparum*. This protection has to be studied in populations where there is little or no acquired immunity against the parasite, because the acquired immunity would protect sicklers and non-sicklers alike. In practice this has meant that the effect could only be demonstrated in children, because usually they are the only persons with little acquired immunity in regions where the incidence of the sickle-cell trait is high enough to provide sufficient subjects for comparison with normal people.

It yet remains to be explained by what means plasmodial growth is inhibited in sickling, and the present paper explores some of the possible explanations. There is an instructive table summarizing experiences gained by the author and others in Uganda [this *Bulletin,* 1955, v. 52, 736 ; 1958, v. 55, 310] and describing the intensity of *P. falciparum* infections in normal, sickle-cell trait, and sickle-cell anaemia children under 10 years of age. Thus of 878 normal children, 456 showed *P. falciparum* in their blood smears. The parasite index in them was 5·87, and the average count of malaria parasites per cmm. was 32,070. The highest count was 800,000 per cmm. Of 183 carriers of the sickle-cell trait 68 showed *P. falciparum*. The parasite index was 3·97 ; the average count was 16,200 per cmm. The highest count was 160,000 per cmm. Of 34 sickle-cell anaemia patients, 9 showed *P. falciparum*. The parasite density index was 1·78 and the average count amounted to 1,160 per cmm. The highest count per cmm. was 10,000. Thus, in gross parasite rate, average parasite count and parasite density index, there is a marked decline from " AA " through " AS " to " SS " subjects.

The children are sub-divided in age-groups: below 6 months ; from 6 months to 1 year ; from 1 to 2 years ; from 2 to 5 years ; and from 5 to 9 years. It is notable that the gradation from " AA " through " AS " to " SS " subjects was present in all age-groups except in the first 6 months of life. It is at this age that erythrocytes containing the adult forms of haemoglobin, A and S, are replacing those containing foetal haemoglobin. At birth the erythrocyte populations of normal infants and those with the sickle-cell trait differ to only a minor degree, because the proportion of adult-type cells containing either haemoglobin A or haemoglobins A and S is still low, and this persists in diminishing degree until the age of about 3 months. In the few malaria infections observed in children under the age of 3 months, which are not shown separately in the tables in this article, the highest counts in " AA " and " AS " children were, in fact, equal. This reinforces the argument that it is the actual erythrocytic content of sickle-cell haemoglobin which is responsible for the protection of sickle-cell trait carriers against heavy parasitaemia.

The present paper concerns itself with the possibility that cells containing sickle-cell haemoglobin do not allow a similar growth of parasites once they are infected, because of a difficulty of utilization of haemoglobin S by the parasite.

The author visited the Medical Research Council Laboratories at Fajara, Gambia, and attempted to cultivate *P. falciparum* in the blood of malarial subjects. Natural infections of moderate intensity, and at an early stage, were sought in normal and in sickling children below the age of 2 or 3 years, so that the effects of acquired immunity might be minimized. For a child of each type, blood was withdrawn from the external jugular vein, and a culture was set up.

These cultures were run in parallel and with the same apparatus under the same conditions. It was not easy to find suitable pairs of subjects, and in fact only two satisfactory experiments could be set up. In both cases effective observation ceased at the end of the first schizogony. Under the conditions of the experiment *P. falciparum* appeared to grow as well and produce as many merozoites in sickling as in normal blood.

The author discusses possible reasons why *P. falciparum* might be less liable to survive in the body of sicklers than of non-sicklers. A reduction in catalase in red cells might interfere with plasmodial growth, because catalase breaks down peroxides, and accumulation of peroxide might interfere with the development of the parasite.

Dr. Raper examined the catalase of the erythrocytes of 79 Gambians and found that there was no significant difference between sickling (non-malarial) subjects and the general population, nor were normal subjects experiencing attacks of malaria distinguished by any change in catalase activity.

The possibility is explored that a mutant strain of *P. falciparum* might have developed in Africa, adapted to survival in the blood of sickle-cell trait carriers. The distribution of various degrees of parasitaemia in normal and sickle-cell trait subjects was measured. There was no bi-modal distribution of parasite density of a kind which would support the theory of the existence of two different strains. Whatever the explanation for the differential response to malarial infection, the author concludes that the transmission of malaria will not be impeded—it may even be enhanced—in populations which contain many sickle-cell trait carriers. The exact mechanism enabling sickle-cell trait carriers to escape heavy *P. falciparum* infections remains yet to be elucidated.

H. Lehmann

BEUTLER, E. **The Hemolytic Effect of Primaquine and Related Compounds: a Review.** *Blood.* 1959, Feb., v. 14, No. 2, 103–39, 9 figs. [147 refs.]

DUPORT, M. & SANDULESCO, M., with the collaboration of A. CRISTESCO, I. COMBIESCO, A. ATHANASIU, I. SANDESCO, S. MAROTINESCO, G. GHEORGHIU & C. SABOTA. Sensibilité de certains anophèles au DDT et au HCH en relation avec la saison et la température. [**Susceptibility of Certain Anophelines to DDT and BHC in Relation to Season and Temperature**] *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 1112–15.

Measurements of susceptibility to DDT and to gamma BHC were made by the Busvine-Nash test on anopheline mosquitoes in Rumania, in areas sprayed continuously since 1947, in areas in which spraying ceased 2–3 years ago and in totally unsprayed areas. The tests were made on mixtures of *A. maculipennis, A. m. messeae, A. m. atroparvus* and *A. sacharovi.* The overall proportions found in any given area are stated, but not the percentages used in each test.

Despite the ambiguity due to the use of mixed species in the tests, it is quite clear that there is a very considerable difference in experiments done in August and October, in several localities. Both with DDT and with BHC, the kills obtained in August are much higher. [Similar results were obtained by DE ZULUETA *et al.* in Iran (this *Bulletin,* 1957, v. 54, 1052).] Presumably this difference is partly due to a change in the physiological state of the mosquitoes

approaching hibernation; but a great deal may also be due to the fact that the temperature in October is roughly 10°C. lower than in August. In support of this the authors quote two sets of data obtained in the summer, one lot done at 3–6°C. lower than the other. A marked difference is evident, mortality being higher in warmer conditions.

Comparison of results from treated and untreated areas gave no indication of acquired resistance. *J. R. Busvine*

RAHMAN, J., SINGH, M. V. & DATTA, S. P. **Study of the Residual Toxicity of Dieldrin in Hardoi District (Uttar Pradesh).** *Indian J. Malariology.* 1958, Sept., v. 12, No. 3, 231–9, 1 map & 4 figs.

Previous experiments on the imagicidal value of such quantities of dieldrin as 6·25, 12·5, 14, 25 and 28 mgm. to the sq. ft. are reviewed [this *Bulletin,* 1956, v. 53, 26]. The authors staged an experiment using a 50% wettable powder applied to give a dose of 12·5 mgm. dieldrin/sq. ft. in an area in Uttar Pradesh. No direct control was made but pre-operational data for 12 weeks were available for comparison with 10 weeks post-operational data. Graphical records indicate a moderate and temporary decrease in anophelines and culicines, interpreted by the authors as lasting for 7 and 8 weeks. The subsequent increase was substantially more rapid in houses with mud walls than in those with solid walls lined with cement plaster. *Anopheles culicifacies* and *A. stephensi* did not reappear for 8 weeks. The percentage of anophelines surviving 24 hours exceeded 50% after 9 weeks, while that of culicines exceeded 50% in 4 weeks. [The dearth of exact figures, together with the lack of a contemporary control, make the interpretation of the data presented very difficult indeed.] *G. Macdonald*

KACHROO, P. & SHARMA, J. C. **Further Observations on the Effects of a Few Herbicides on the Aquatic Flora of Bokaro Reservoir.** *Indian J. Malariology.* 1958, Sept., v. 12, No. 3, 253–7.

[See this *Bulletin,* 1958, v. 55, 252.]

SCOTT, A. **Malaria Control in a Tea Estate Practice in Assam.** *J. Trop. Med. & Hyg.* 1958, Nov., v. 61, No. 11, 269–73, 1 map & 1 graph.

Concise, objective data are given on the mechanism and results of malaria control in a group of tea estates, with a population of 28,000 persons, in Assam where malaria is carried by *Anopheles minimus minimus* from March onwards throughout the year and where, before the war, the average spleen rate was 50–60% and the malaria morbidity exceeded 500 cases per 1,000 population annually. From 1947 to 1954 chemoprophylaxis with weekly or bi-weekly doses of mepacrine or proguanil was practised with material improvement of conditions. In 1954 an attempted change to residual spraying was foiled by breakdown in supplies with a consequent recurrence of the disease. Since then, however, full control has been established by means of gamma BHC at an intended dose of 10 mgm. per sq. ft. at intervals of 4–5 or 6–7 weeks to give a total of 5–7 applications in the year, strong emphasis being placed on the first

application being early, before transmission started. Malaria morbidity has decreased to 18 per 1,000 and there has been a coincident decrease of total morbidity from all causes to half the level of 1945, and the spleen rate has fallen to 0·4%. There have been marked decreases in the crude death rate, the infant mortality and the neo-natal mortality rates which, in parallel with the decreased malaria, appeared to be its result. *G. Macdonald*

COWPER, S. G. & WOODWARD, S. F. **A Note on Infection of the Multimammate Rat,** *Rattus* (*Mastomys*) *natalensis erythroleucus* **with** *Plasmodium berghei*. *West African Med. J.* 1958, Sept., v. 7 (n.s.), No. 3, 151–3.

" The multimammate rat gives a particularly high yield of *P. berghei* parasites at all stages in the peripheral blood and deep viscera. It develops splenomegaly and hepatomegaly, with yellow pigment, beyond that normally seen in white mice and rats. It endures a very advanced degree of anaemia and a very high parasitaemia rate before it succumbs.

" Accounts of *P. berghei* infection in laboratory white rats have been given in some detail by ARCOLO and CARESCIA (1955), SINGER *et al.* (1955) and HILL (1950). In comparison with these it seems to the writers that the multimammate rat is particularly suitable for work requiring a high parasitaemia continued over a period of ten days or so. Work will continue if further multimammate rats should be obtainable."

FABIANI, G., ORFILA, Jeanne & BONHOURE, G. Effet de la splénectomie sur le paludisme de rats blancs précédemment infectés par *Plasmodium vinckei*. [**Effect of Splenectomy on Malaria in White Rats previously infected with** *Plasmodium vinckei*] *C.R. Soc. Biol.* 1957, v. 151, No. 12, 2135–7.

23 young and 17 adult white rats were infected with *Plasmodium vinckei* and their spleens were removed at varying intervals afterwards. This parasite provokes only a mild reaction in the intact rat, but after splenectomy was found to cause a fatal infection in 1 young and 2 adult animals; in the others, a mild increase in the parasitaemia was usually the most that happened. However, if the splenectomized animals were challenged with another dose of the parasite again fatal infections might ensue, though the usual result was merely a fleeting re-appearance of the organism. *P. C. C. Garnham*

RAGAB, H. A. A. **Effect of the** *Plasmodium* **on the transmitting Mosquito Host from the Point of View of the Longevity of the Infected Mosquito.** *J. Egyptian Med. Ass.* 1958, v. 41, Nos. 9/10, 447–54. [12 refs.]

A review of the literature shows that although some earlier workers found evidence of deleterious effects on mosquitoes by infection with malaria parasites, others did not. The present paper reports experiments with *Aëdes aegypti* infected with *Plasmodium gallinaceum* from chicks. Infected series, and controls, were kept at 25°C. and 75% RH, and also at 18°C. and 30–40% RH. The mosquitoes, about 100 to 200 per series, were 5 days old when infected and deaths were noted over a period of 20 days. In all groups there were many

deaths in the first 5 days, but neither in this period nor later were differences in daily mortality notable. [The degree of infection is not noted; the infected groups did transmit the infection to clean chicks.] *D. S. Bertram*

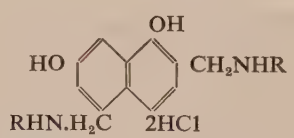
Sen Gupta, G. P., Misra, B. G. & Ray, A. P. **Effect of Active Metabolite of Bromoguanide (M.I.S. 11) on the Sporogony Cycle of *P. gallinaceum* (Brumpt 1935).** *Indian J. Malariology*. 1958, Sept., v. 12, No. 3, 241–5. [13 refs.]

The substance named in the title has been shown to possess marked activity against *Plasmodium gallinaceum* and *P. cynomolgi* [this *Bulletin*, 1955, v. 52, 16, 515]. It shows also a high degree of activity against asexual forms of *P. vivax* but against gametocytes of the parasite its action is slow [*ibid.*, 1957, v. 54, 1153].

The effect of the above compound on the developmental stages of *P. gallinaceum* in *Aëdes aegypti* has now been studied. After feeding, the mosquitoes were maintained at a temperature of 80 to 85°F. and relative humidity of 80 to 85%. Batches of mosquitoes, which served as controls, were fed on the fowls before the latter were treated with the drug. Other batches of mosquitoes were fed every 4 hours after the infected fowls had been given the drug and thereafter once per day for 6 days. The drug dosage was 3·5 or 7·0 mgm. per kgm. given in one dose, or the smaller dose was also given on two successive days. The state of mosquito infection was determined by dissection from the 5th to the 19th day after the infective feed and the viability of sporozoites was shown by infecting fowls. Sporozoites were absent in mosquitoes fed 4–8 hours after drug administration, and their development was somewhat retarded up to 2 days after drug administration. Oöcysts were scanty in comparison with those present in the controls. Thereafter the pattern in all cases was similar and indicated that the action of the drug on the development of the parasite in *Aëdes aegypti* was negligible. *J. D. Fulton*

Sen Gupta, G. P., Sharma, G. K., Singh, H. & Ray, A. P. **Screening of Compound 377C54 against Avian and Simian Malaria Parasites.** *Indian J. Malariology*. 1958, Sept., v. 12, No. 3, 247–52. [12 refs.]

The compound used in these experiments, 1:6 dihydroxy-2:5 bis(cyclohexylaminomethyl)naphthalene dihydrochloride, has the following formula



where R = cyclohexyl.

It has been shown to possess activity against the blood forms of avian and simian malaria as well as those of human malaria [this *Bulletin*, 1957, v. 54, 1153, 1161]. The present authors have carried out further tests both against *P. gallinaceum* and the Nuri strain of *P. knowlesi* [*ibid.*, 1954, v. 51, 19, 20] by

the methods described [*ibid.*, 1953, v. 50, 678]. In chickens drug dosage schedules were 0·4 to 6·4 mgm. per 50 gm. body weight of host: the minimum effective dose was 0·65 mgm./50 gm. From the data it appeared that the drug was 2–3 times as active as quinine but was less effective than chloroquine. In monkeys the dosages used were 4·75 to 12 mgm. per kgm. body weight. With a dosage of 5·5 mgm. per kgm. parasites disappeared from the blood in 18 to 32 hours and complete sterilization of the infection resulted. The drug had about 6 times the activity of quinine and one-third that of chloroquine in the monkey infection. *J. D. Fulton*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:— epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

See also p. 677, COLONIAL OFFICE. **Colonial Research 1957–1958. Tsetse Fly and Trypanosomiasis Committee. Report for 1957–1958.**

WIJERS, D. J. B. **Factors that may influence the Infection Rate of** *Glossina palpalis* **with** *Trypanosoma gambiense*. **I.—The Age of the Fly at the Time of the Infected Feed.** *Ann. Trop. Med. & Parasit.* 1958, Dec., v. 52. No. 4, 385–90. [18 refs.]

Variable results have been obtained by different workers attempting to assess the factors responsible for low infection rates with trypanosomes of experimental tsetse flies. The author, in studying the effect of the age of flies at the time of feeding, exposed *Glossina palpalis* at varying intervals after emergence to monkeys (*Erythrocebus patas patas*) infected with 2 strains of *Trypanosoma gambiense* of different virulence.

Flies were given infective feeds 1, 2, 3 and more days after emergence and salivary slide tests carried out 19 days after feeding. In all cases flies surviving to 35 days were dissected to see if gut infections, or overlooked gland infections, were present.

The results of this work showed an average infection rate of 7·6% in first-day flies, 1·9% in second-day, 0·7% in third-day and 0·0% in a group of 37 older flies which were tried. The explanation for this finding—that the peritrophic membrane in the gut of the young fly may be weak or incomplete—is put forward and the epidemiological implications discussed. *E. R. Nye*

POTTS, W. H. **Sterilization of Tsetse-Flies (*Glossina*) by Gamma Irradiation.** *Ann. Trop. Med. & Parasit.* 1958, Dec., v. 52, No. 4, 484–99. [15 refs.]

Following the findings of BUSHLAND and HOPKINS [this *Bulletin*, 1954, v. 51, 322] that irradiation of pupae or males of the screw-worm fly, *Callitroga*

hominivorax, resulted in unproductive matings, the author investigated the possibilities of this method in the control of tsetse flies.

In this laboratory study "wild" *Glossina morsitans* pupae from Tanganyika were flown to England and exposed to gamma radiation from a cobalt source. In three main groups of pupae studied the duration of exposure of the pupae to radiation was for periods of half an hour, one and two hours, to a source of 6×10^3 r/hr in various batches; another batch was exposed for 5 minutes to a source of 36×10^4 r/hr. Adult flies emerging from the irradiated and from non-irradiated control pupae were maintained in the laboratory and their reproductive capacities studied.

Analysis of the results showed that there was increased pupal mortality at the radiation dosage given at high rate but no increased mortality at doses of up to 12×10^3 r.e.p. (röntgen equivalent physical). The length of life of males from irradiated pupae was approximately halved but there was no loss of mating ability. Irradiation resulted in only about 10% of the males being fertile compared with about 16% of the females, with an indication that normal females mated with irradiated males produced fewer pupae than when mated with normal males. The results are given with some reserve because of the small number of insects used; of 3,194 pupae received, 1,156 emerged, which were divided into test and control groups for the three experiments.

E. R. Nye

KLINKHAMER, L. V. **Hypoglycaemia during Pentamidine Treatment for Trypanosomiasis.** *Trop. & Geograph. Med.* Amsterdam. 1958, Dec., v. 10, No. 4, 332–6. 1 chart.

Trypanosomiasis is often seen at the Firestone Plantations in Liberia. Tryparsamide treatment of patients at a late stage of the disease is unsatisfactory, if only on account of the permanent residual psychopathies it fails to resolve. Early diagnosis, and treatment with pentamidine isethionate, are now the aim.

The hypoglycaemic side-effects of pentamidine treatment have not so far received the attention they merit. The author cites details of 3 patients (aged 12, 13 and 20 years, respectively), all with trypanosome-positive glands, who were given pentamidine (about 4 mgm./kgm. daily) and became hypoglycaemic; the 2 youngest suffered gross manifestations of this. Blood sugar level estimations in each of the 3 patients showed a fall to under 60 mgm. by the tenth day of treatment. Extra-dietary sugar, or intravenous glucose in one patient who was thought to suffer from hypoglycaemic coma, rapidly relieved the hypoglycaemic manifestations.

[See also this *Bulletin*, 1957, v. 54, 403.] *A. R. D. Adams*

ADLER, S. **The Action of Specific Serum on a Strain of** *Trypanosoma cruzi*. *Ann. Trop. Med. & Parasit.* 1958, Oct., v. 52, No. 3, 282–301, 7 text figs. & 32 figs. on 6 pls. [14 refs.]

The author describes his studies on the effect of specific serum on the morphology and development of *Trypanosoma cruzi* in culture, for which semi-solid Locke-serum-agar and the CITRI and GROSSOWICZ [this *Bulletin*, 1956, v. 53, 297] media were used, while immune sera were produced in rabbits by

intravenous injections of cultures. The action of serum upon the trypanosomes was observed in 2 ways: (1) by addition of serum to fully developed cultures, and (2) by incorporating varying dilutions of the serum in the medium before the flagellates were inoculated into it. The cultures were incubated at 26°C., and examined at intervals of a few days in fresh and stained preparations. Agglutination of the flagellates was prevented by placing them with the serum in tubes, in which they were evenly distributed by shaking.

Addition of specific serum to a culture (titres 1:20,000–1:50,000) caused immobilization and clumping of the majority of flagellates, as well as formation of chains of flagellates. There also appeared multinucleate masses in which the individual flagellates had fused together, owing to destruction of their cell walls by the action of the serum.

In cultures made up with specific serum, after 4 days the flagellates formed irregular masses consisting of up to 80 agglutinated organisms, with or without cell boundaries and flagella, and measuring up to 50 μ. After 6–8 days syncytia up to 180 μ were formed, with hundreds of nuclei and other organellae scattered irregularly in the cytoplasm. Specific serum thus "produces an apparent anarchy in the pattern of growth" of *T. cruzi*. The agglutinated masses of flagellates, which may reach the size of 700 μ, eventually become differentiated into leishmanial, crithidial and trypanosome forms, the predominating type depending upon the concentration of the serum in the medium. In high dilutions the flagellates form colonies measuring up to 400 μ, in which the organisms are not agglutinated but adhere to each other after division.

A detailed account is given of the development of multinucleate masses from individual flagellates, which was also followed in tubes in which they were evenly distributed in the medium containing specific serum. It was found that trypanosomes were less susceptible to immobilization by the serum than crithidia, and this property is regarded as an adaptation which enables *T. cruzi* to withstand the action of antibodies in the vertebrate host.

In discussing his observations, the author emphasizes the difference between the development of *T. cruzi in vitro,* in the presence of specific serum, and *in vivo,* and suggests that, in the latter case, the parasites multiplying intracellularly are probably protected from the action of the host's antibodies. The paper is copiously illustrated by photomicrographs and drawings. *C. A. Hoare*

Dias, E. & Dias, N. P. Ausrottung von Raubwanzen in Bambui, Brasilien. **[Extermination of Triatomid Bugs in Bambui, Brazil]** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 4, 291–3.

The English summary appended to the paper is as follows:—

"By large-scale control measures (August, 1956 to February, 1957), which were applied in the district of Bambui (Minas Gerais), Brazil, the triatomids transmitting Chagas' disease (*Triatoma infestans* and *Panstrongylus megistus*) were practically exterminated in this area. At least there have been no acute infections with *Schizotrypanum cruzi* for the last 18 months.

"For the control of the triatomids hexacyclic hexachloride (HCH) was used. Walls of the infested houses were not sprayed uniformly with this insecticide, but special care was taken to apply it to the bugs' breeding places. Spraying was repeated after 30 days. Then again the houses were intensively searched

for remaining triatomids and sprayed for a third time if necessary. A single spraying has not an exterminating effect as the eggs of the triatomids are not killed by the insecticide."

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

PELLEGRINO, J., BRENER, Z. & SANTOS, U. M. **Complement Fixation Test in Kala-Azar using** *Mycobacterium butyricum* **Antigen.** [Research Notes.] *J. Parasitology.* 1958, Dec., v. 44, No. 6, 645.

Several species of mycobacteria have been used as antigens in the complement-fixation test for kala azar [see, for example, this *Bulletin,* 1958, v. 55, 993, 994].

The authors from Belo Horizonte, Brazil, have used *Mycobacterium butyricum* which is non-pathogenic, easily cultivated in large quantities in glycerin-broth medium and available commercially in dried powder form (Difco Laboratories, Detroit).

The antigen was used in tests (Kolmer's technique) on sera from 6 patients with kala azar and from 5 dogs naturally infected with *Leishmania donovani.* All were positive in titres from 1 in 80 to 1 in 5,120. Negative results were obtained from healthy persons and from those with chronic Chagas's disease, mucocutaneous leishmaniasis, syphilis, schistosomiasis and tuberculoid leprosy. In 40% of patients with lepromatous leprosy, in 3 of 15 cases of active tuberculosis and in an acute case of Chagas's disease cross-reactions were obtained. The results are similar to those obtained with antigens made from tubercle bacilli [*loc. cit.*].

The antigen was prepared by adding 10 ml. of acetone to 100 mgm. of dried *Myco. butyricum* and extracting the material overnight at 37°C. The acetone was decanted after centrifugation and the residue evaporated under vacuum. 15 ml. of methyl alcohol were added to the sediment and the suspension was left at room temperature for 3 days with frequent shaking. The antigen (which was the clear supernatant) remained stable at room temperature and was not anticomplementary. The optimal dilution for use in the test was determined by block titration. *H. J. O'D. Burke-Gaffney*

CANOVA, R. & LELONG, Y. Nouveaux cas de " clou de Mila ". [**New Cases of Oriental Sore** (*" Clou de Mila "*)] *Arch. Inst. Pasteur d'Algérie.* 1958, Dec., v. 36, No. 4, 479–82, 1 fig.

The following is a translation of the authors' summary:—

In 1958 two new cases of oriental sore were observed which were contracted outside the Sahara in Mila (Department of Constantine), which is an old persistent focus of cutaneous leishmaniasis. In these cases, one of which had

developed during the course of 2 years, treatment with glucantime resulted in rapid cure.

[See also this *Bulletin*, 1955, v. 52, 260.] *H. J. O'D. Burke-Gaffney*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Mariev, A. N. & Kuz'mina, A. I. **On the Epidemiology of Typhus.** *Problems of Virology.* London. 1958, v. 3, No. 3, 181–2. [Translated from Russian.]

The authors made epidemiological, serological and clinical studies of 112 patients with typhus in Stalingrad in 1954 and 1956. 69·7% were women and 75% were over 40 years old. It was determined that 52·6% had previously suffered from typhus. 42·8% were labourers, 38·4% housewives, 17·9% clerical workers and 0·9% students. In 57·2% the onset was acute and in 75·9% the course was moderately severe. It was mild in 9·8% and severe (sometimes with delirium) in only 14·3%.

A roseolar rash was seen alone in 41·1% of the patients, with petechiae in 56·2%, and petechiae alone were seen in 2·7%. Fever lasted for 5 to 9 days in 20·6%, for 9 to 12 days in 56·2%, for 13 days or more in 22·3%, for less than 5 days in only 0·9%. Only 2 patients suffered from complications.

Diagnosis was confirmed by the Weil-Felix reaction with *Proteus X19* in 90·4% and with *Rickettsia prowazeki* in 80·3% [this reversal of usual experience is commented upon in an editorial footnote which suggests that it was probably due to the poor quality of the rickettsial antigen used]. Some cases were confirmed by complement-fixation tests.

Half the cases occurred in the winter months, January–March and October–December. Cases occurred in every district and no contact between patients was revealed. Pediculosis was found in only 5·4% of the foci, the remainder of which were in a satisfactory sanitary state. No further cases were found in the foci.

Most of the patients were sent to hospitals rather late; thus only 11·6% arrived in the first 3 days, 29·6% on the fourth and fifth day and the remainder after 5 days illness.

Taking all these facts into consideration, the authors presume that the cases belonged for the most part to the relapsing type of typhus.

H. J. O'D. Burke-Gaffney

Juillan, M. Recherche de la réaction de Weil-Felix chez des chèvres et des moutons de la région d'Alger. [**The Weil-Felix Test in Goats and Sheep in the Algiers Area**] *Arch. Inst. Pasteur d'Algérie.* 1958, Dec., v. 36, No. 4, 451–4. [14 refs.]

Sera from 104 of 116 goats and all of 15 sheep were negative. Epidemic typhus in man is rare in the region.

Zdrodovskii, P. F., Golinevich, E. M. & Iablonskaia, V. A. **The Characteristics of Strain E of *Rickettsia prowazeki* and its Pathogenic Properties.** *Problems of Virology*. London. 1958, v. 3, No. 3, 145–51. [Translated from Russian.]

Zdrodovskii, P. F. **The Problem of Live Typhus Vaccine.** *Problems of Virology*. London. 1958, v. 3, No. 3, 141–5. [Translated from Russian.]

The advantages of live over killed typhus vaccine are discussed and past experience with vaccines containing living rickettsiae (*Rickettsia mooseri, R. prowazeki*) of low virulence for man is reviewed. A comparison of the Spanish strain E [this *Bulletin,* 1958, v. 55, 492] and the Breinl strain of *R. prowazeki* was recently undertaken in the author's laboratory; the two strains were indistinguishable morphologically, culturally and antigenically, but strain E was much less pathogenic for rabbits and guineapigs. It is concluded from these results and reports in the literature that strain E has "completely satisfactory immunogenic properties" which support its use for immunization of man.

R. S. F. Hennessey

Koch, A. & Benkö, A. **The Use of Carbon Tetrachloride in the Production of Cox-Type Typhus Vaccine.** *Acta Microbiologica.* Budapest. 1958, v. 5, No. 4, 411–14.

"The use of CCl_4 in the extraction and purification of infected yolk-sac suspensions for the production of typhus vaccine seems to be justified on the following grounds.

"The procedure is remarkably simplified.

"The vaccine, prepared by extraction with a saline solution containing phenol in the presence of 10 per cent by volume of CCl_4, contains 24 per cent less dry substance than the vaccine previously used in Hungary.

"No residual CCl_4 was demonstrated in the final product by Fuyiwara's test (sensitivity, 1 mg CCl_4 in 1 ml vaccine).

"The antigenicity of the vaccine prepared by the CCl_4 method was found satisfactory when tested in guinea pigs.

"No untoward effects were observed after the vaccination of humans, or on injecting 1000 times and 4000 times the human dose by kg body weight to guinea pigs and mice, respectively."

Kawamura, A., Jr., Shimojo, H., Yamanè, K., Hara, H. & Aikawa, K. **Preparation of Complement-Fixing Antigen of Rickettsiae.** *Japanese J. Exper. Med.* 1958, Oct., v. 28, No. 5, 317–27, 1 fig. [39 refs.]

Rickettsial preparations giving specific complement-fixation reactions with antisera for strains of the *Rickettsia orientalis* group and for *R. tamiyai* [this *Bulletin,* 1956, v. 53, 567] (isolated from cases of Ezo fever) were obtained by treating ether-extracted antigens of the Cox-Craigie type with 50% ethanol. Antigens prepared in this manner were not initially anti-complementary but tended to become so on storage; the anti-complementary effect was removable

by treatment with ether. Some immune sera failed to react with the antigens, and attempts were made to obtain more satisfactory preparations [see below].

R. S. F. Hennessey

Yamamoto, T., Kawamura, A., Jr., Hara, H. & Aikawa, K. **Partial Purification of Rickettsiae with a Cation Exchange Resin. 1. Method of Purification.** *Japanese J. Exper. Med.* 1958, Oct., v. 28, No. 5, 329–36, 5 figs. (3 on pl.) [26 refs.]

This paper gives details of a method by which satisfactory partial purification of suspensions of *Rickettsia mooseri, R. orientalis* and *R. tamiyai* was readily achieved by treating yolk sac homogenates in sucrose PG solution [containing potassium phosphates and glutamate; this *Bulletin,* 1950, v. 47, 832] with a cation exchange resin (Amberlite XE-64, Mix 1A). The purified preparations contained 5–10% of the nitrogen content of the original homogenates and " showed excellent results in diagnosis and identification of rickettsiae, especially in Tsutsugamushi group ". The procedure is considered superior to previously described methods of purification because of its simplicity.

R. S. F. Hennessey

Kiselev, R. I. & Bekker, M. L. **An Allergic Component of the Agent of Rickettsialpox.** *Problems of Virology.* London. 1958, v. 3, No. 3, 151–4, 1 fig. [Translated from Russian.]

It has been shown that rickettsiae possess an allergic in addition to a toxic component, giving rise to lesions on injection into the skin, but various substances used as preservatives undoubtedly have some effect on the development of skin reactions.

The authors prepared a lysate of *Dermacentroxenus murinus* and isolated 4 fractions from it by electrophoresis. Skin tests on guineapigs immune to rickettsialpox showed that the third fraction gave a strongly positive reaction, the second fraction gave a slight reaction but the first and fourth fractions gave negative results.

It is claimed that the fourth fraction possessed complement-fixing activity to the same degree as the whole lysate and that the other fractions possessed considerably less activity [but this is not borne out by the table in the text, which shows that all 4 possessed less activity than the whole lysate].

P. A. Clearkin

Berni, A. Rickettsiosi umane. La febbre bottonosa mediterranea nell'Agro romano. [**Boutonneuse Fever in the Commune of Rome**] *Nuovi Ann. d'Igiene e Microbiol.* 1958, Nov.–Dec., v. 9, No. 6, 485–93, 4 figs. [18 refs.] English summary (3 lines).

After a brief description of human rickettsial diseases, the author refers to 156 cases of boutonneuse fever which occurred in Rome and its surrounding country between 1952 and 1957. It is endemic in the summer when it is transmitted by the dog tick, *Rhipicephalus sanguineus,* occurring especially where flocks of sheep move about, where stray dogs abound, and in areas frequented by huntsmen. The usual symptoms are manifest, the Weil-Felix reaction [no

details of which are given] generally being positive by the fourteenth day of the illness. Only 2 cases were fatal. Prophylaxis is best directed towards keeping dogs free from ticks. *E. Agius*

Rehn, F. & Radvan, R. Isolace *Coxiella burneti* z rejska obecného (*Sorex araneus*) pocházejícího z ohniska q horečky v severovýchodních čechách. [**Isolation of** *Coxiella burneti* **from the Common Shrew-Mouse** (*Sorex araneus*), **caught in a Focus of Q Fever in North-Eastern Bohemia**] *Českoslov. Epidemiol., Mikrobiol., Imunol.* Prague. 1959, v. 8, No. 1, 49–51, 1 fig.

The English summary appended to the paper is as follows:—

"The authors trapped eight common shrew-mice in a natural focus of Q-rickettsiosis in North-eastern Bohemia. Examination of heart eluates for CF antibodies was negative in all the cases. From one of the shrew-mice a strain of Coxiella burneti was isolated. Attention is called to the fact that the shrew in which the isolation experiment was successful was caught in a small locality which formed an optimal biotope for the developmental cycle of ticks and was bordered all round by a spruce monoculture."

Brezina, R. **A Change in the Virulence of the Henzerling Strain of** *Coxiella burneti* **during Passage in White Mice.** *Acta Virologica.* Prague. 1958, Oct.–Dec., v. 2, No. 4, 220–27. [12 refs.]

The egg-adapted Henzerling strain of *Rickettsia burneti* showed increased virulence for guineapigs after 10 passages in mice by the intraperitoneal route, inoculation of a mouse-spleen suspension generally killing guineapigs in 9–10 days. When this "mouse" strain was re-adapted to eggs (2 passages), dilutions of yolk sac suspension up to 1 in 10^{10} caused obvious signs of infection in all guineapigs inoculated, the original "egg" strain producing low fever of short duration in only a proportion of guineapigs receiving suspensions diluted 1 in 10^4 or more. Higher levels of complement-fixing antibodies and immunity developed in guineapigs infected with the "mouse" strain than in those infected with the "egg" strain; antibodies reacting with Phase I antigen appeared after infection with the "mouse" strain. Inactivated suspensions of the "mouse" strain elicited higher levels of antibodies than were obtained with the "egg" strain, indicating that the antigenicity of the Henzerling strain had increased during mouse passage. These findings may be of significance in connexion with the selection of strains for preparing vaccines against Q fever.

R. S. F. Hennessey

Gerbec, M., Morelj, M. & Pagon, S. **Low Antibody Titres in the Complement Fixation Test—a Specific Tool in the Epidemiology of Q-Fever.** *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1958, v. 2, No. 4, 395–403. [21 refs.]

The percentage of positive complement-fixation tests with *Rickettsia burneti* antigen among 261 sera from persons in an area where Q fever was known to be endemic (Pirot district of Yugoslavia) was more than 4 times greater (71·36% as against 16·47%) when the range of serum dilutions extended from 1 in 1

[undiluted serum] to 1 in 128 than when it extended from 1 in 8 to 1 in 128. The specificity of positive reactions with serum diluted less than 1 in 8 was supported by tests on human and animal sera from non-endemic areas; 1·72% of 5,968 human sera and 0·42% of 5,247 animal sera gave positive reactions at titres below 1 in 8, suggesting that the risk of non-specificity at these titres was under 2% for human sera and under 0·5% for animal sera. Negative tests with *R. prowazeki* antigen and normal yolk sac antigen provided further evidence that titres of 1 in 1 were specific and indicative of previous contact with *R. burneti*. *R. S. F. Hennessey*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Boyd, J. S. K. **Yellow Fever and its Prevention.** *J. Roy. Inst. Pub. Health & Hyg.* 1959, Jan., v. 22, No. 1, 11–25, 4 figs.

On the occasion of the commemoration of a patron of the Institute, General Robert James Blackham, the author reviews the history of yellow fever from American records possibly referring to it before the first contacts with Europe, to the present time. The emphasis is, however, on the history of the discovery of the transmissible nature of the disease, the agent of transmission, the mosquito, the virus which is its aetiological agent, the unravelling of the accounts of jungle yellow fever, and latterly the considerable outbreaks in the monkey populations of Central America. Attention is focused on the Carlos Finlay story and the discoveries by Reed, Carroll and Agramonte and Lazear, but it is balanced by a full and interesting account of the work of the Rockefeller Yellow Fever Commission in West Africa which led to the identification of the virus and to the deaths of several of the distinguished workers involved. The development of the vaccine and its wide successful use in the control of yellow fever are recorded and the value of this measure in preventing the invasion of the East by yellow fever is described. [This paper is an extremely interesting brief historical survey.] *G. Macdonald*

Collier, W. A., De Roever-Bonnet, H. & Hoekstra, J. **The Eclipse Phenomenon in Yellow Fever Infection of Mice.** *Trop. & Geograph. Med.* Amsterdam. 1958, Dec., v. 10, No. 4, 316–22, 1 graph.

The amount of infective virus recoverable from the brains of mice killed at intervals up to 24 hours after intracerebral inoculation with yellow fever virus (Asibi; 17D; a neurotropic strain of 17D) was less than that expected, having regard to the size of the inoculum. Thus, out of 332 mice injected intracerebrally with brain suspension from mice infected 15 minutes to 24 hours previously, 121 died and only 17 survivors were immune when tested with the Asibi strain; the calculated quantity of virus in the total brain mass of the infected mice was theoretically sufficient to provide a lethal dose for each

subinoculated mouse. This result is taken to be a demonstration of the eclipse phenomenon. The titre of 17D virus was not affected by contact with a 10% suspension of normal mouse brain for up to $3\frac{1}{4}$ hours, suggesting that the phenomenon requires live cells with active metabolism. *R. S. F. Hennessey*

See also p. 668, SENEVET *et al.*, *Aedes aegypti* à Alger. [*Aëdes aegypti* **in Algiers**]

THEILER, M. & CASALS, J. **The Serological Reactions in Yellow Fever.** *Amer. J. Trop. Med. & Hyg.* 1958, Nov., v. 7, No. 6, 585–94. [10 refs.]

This is an important study of serial serum samples from yellow fever cases proven by virus isolation. The patients were in either Brazil or Trinidad and their sera were tested by neutralization (N), haemagglutinin-inhibiting (HI) and complement-fixation (CF) tests against yellow fever, Ilheus, dengue-1, St. Louis, and dengue-2 viruses. The patients fell into 2 well-defined groups based on the pattern of their antibody response. One group gave clear-cut positive CF titres only to yellow fever in their convalescent sera or reacted only in much lower titre with the other antigens; the HI responses were less specific but in most cases the homologous response was highest. In a second group the convalescent sera had CF and HI antibody to 3 or more antigens and the heterologous responses were often higher than the homologous. In the first group none of the early acute phase sera had antibody to any of the viruses, while in the second group 4 of 11 had N antibody to Ilheus and 8 of them HI or CF antibody. The first group were almost certainly patients with no previous B arborvirus infection while the second group were patients previously infected with at least one virus of the group. In the primary infections HI antibody appeared earlier than CF antibody and homologous before heterologous antibody. Heterologous antibody appeared only where the homologous titre was high. N antibody varied in its time of appearance from the 5th day until after the 36th day after onset. The responses to the secondary infections were broad and high titred with both the HI and CF tests and the antibodies seemed to appear earlier than in the primary infections. The majority of patients with secondary infections developed N antibody to dengue-1 as well as to yellow fever. CF with a battery of antigens seems to be best for distinguishing primary from secondary infections with B arborviruses. Obviously serological diagnosis of secondary infections is often difficult or impossible and definitive diagnosis of the causative virus must depend on its isolation and identification.

C. E. Gordon Smith

HUGHES, J. H. & PORTER, J. E. **Measures against Yellow Fever Entry into the United States.** *Pub. Health Rep.* Wash. 1958, Dec., v. 73, No. 12, 1101–6, 1 map. [16 refs.]

The northward movement of yellow fever in Central America has caused the U.S. to review its security which had seemed fairly firm, the last epidemic having been in 1905 and the last suspected case intercepted at a port in 1924. The receptive areas in the U.S.A. have been defined, *Aëdes aegypti* is

known to be widely distributed in them, and the *Aëdes aegypti* control programme carried out by the Public Health Service was discontinued after the close of the last war, since when reliance for protection has been placed on the disinsectization of aerial and other transport and the requirement of vaccination where appropriate. Since 1957, however, interest in the control of the vector in the U.S. has increased: entomological units have been established in Florida, Texas and Louisiana, charged with carrying out surveys, maintaining control on airfields and arranging control measures and clean-up campaigns in conjunction with the surveys. The early results of these surveys show considerable breeding of *Aëdes aegypti* in places of possible importance: 6 of the Florida airports, 10 of the Florida docks and other airports and dock areas along the Atlantic coast as far north as North Carolina. Among other places, this species was found in the island of Key West, Florida, which has been reputedly free since 1948 and apparently recently re-invaded. *G. Macdonald*

RABIES

See also p. 655, Soave & Lennette, **Naturally Acquired Toxoplasmosis in the Gray Squirrel, *Sciurus griseus,* and its bearing on the Laboratory Diagnosis of Rabies.**

Svet-Moldavskaya, I. A. **Experimental Study of the Infectivity of Salivary Glands of Laboratory Animals in the Latent Form of Street Rabies.** *Acta Virologica.* Prague. 1958, Oct.–Dec., v. 2, No. 4, 228–34.

Results of previous investigations reported by the author in 1953 and 1957 had shown that, after the inoculation of white mice or rats with street rabies virus, introduced subcutaneously or through the undamaged mucous epithelium of the alimentary tract, nose or eye, an asymptomatic form of infection could sometimes be observed, with protracted persistence of the virus in the central nervous system and salivary glands. In such cases the virus had been isolated solely from post-mortem material, and the possibility that the animals were, when killed, in a pre-clinical stage of rabies could not, therefore, be excluded. In an endeavour to settle the question raised by this possibility, the author devised a method of *intra-vitam* salivary gland removal, which would permit observation of the test animals for any desired period of time after demonstration of the virus in the excised material. The present paper records the results obtained from the use of this method in a series of experiments on white rats infected with street rabies virus. In these experiments street virus was introduced into rats, 5–6 weeks old, by one or other of the following routes: subcutaneously, by injecting 0·5 ml. of a 10% brain suspension into the spinal region; intranasally, by inoculating 2 drops of the same suspension into each nostril; *via* the conjunctivae, by applying 1 drop of that suspension to each eye; and *via* the alimentary canal, by allowing each rat to eat one whole mouse brain containing the virus. Thereafter, at different time intervals after inoculation, the right submaxillary glands were removed *intra-vitam* from the rats—

all clinically healthy at the time—and tested for infectivity by intracerebral inoculation of white mice. The rats were then observed for different periods of time, at the end of which, or in those cases which showed signs of rabies, the animals were killed and their brains and salivary glands subjected to the mouse inoculation test for demonstration of the virus.

The main results after inoculation by the different routes may be summarized as below:

(a) Subcutaneous inoculation: of 7 rats, from which glands had been removed on the 11th day after infection, 3 showed virus in the excised glands; of these 3, one developed rabies on the 5th post-operation day and 2 were observed for 6 months and then killed when clinically healthy; neither showed virus in brain or salivary gland.

(b) *via* the alimentary tract: of 3 rats, from which the glands were removed on the 8th day after infection, 2 showed virus in the excised glands. All 3, observed for 70 days after gland testing, were clinically healthy when killed. Post mortem, the virus was recovered from the brain in all 3 cases and from the salivary gland also in one case. In a second group, from which glands were excised on the 15th day after infection, the virus was recovered from 3 of the 4 glands tested; the 4 rats concerned were kept under observation for 63 days, without showing any signs of rabies, and killed; of these, 2 showed virus in both brain and salivary gland. In 2 other groups (each of 4 rats) with gland removal on the 23rd and 65th day, respectively, after infection, 3 and 2, respectively, of the excised glands contained virus. Post mortem, virus was isolated from the salivary gland, but not from the brain, of one animal operated on on the 23rd post-infection day and observed thereafter for 5 months.

(c) *via* the conjunctivae: among groups, each of 4 rats, from which glands were removed on the 7th (group I), 14th (group II), 30th (group III), and 45th (group IV) day, respectively, virus was recovered *intra-vitam* from one animal in each of groups II, III and IV. Post mortem, the virus was recovered from animals killed while clinically healthy: in group I, from the salivary glands of 2, observed for 2 months, and from the brain of one, observed for 6 months; in group II, from the brain and salivary gland of one, and from the brain of another, observed for 52 days; and in group IV, from the brain of one, killed 3 weeks after operation.

(d) intranasal inoculation: among groups, each of 4 rats, with gland excision on the 7th (group I), 14th (group II), 30th (group III) and 45th (group IV) day, respectively, after infection, virus was demonstrated in glands removed *intra-vitam*: twice in group I and once in group IV. Post mortem, virus was recovered from animals killed while clinically healthy: in group I, from the brain and salivary gland of one rat and from the brain of another, observed for 2 months; in group II, from the salivary gland of one rat, observed for 7 weeks; and in group III, from the salivary gland of one rat, observed for 5 weeks.

From the above results it is clear that the animals inoculated by one or other of the routes indicated "did not manifest any signs of disease for a period substantially longer than is the usual incubation period of rabies, *i.e.*, they were really latent virus carriers"; and that "following infection of animals by routes which may occur under natural conditions, the disease may remain restricted to latent survival of the etiological agent in salivary glands".

Finally, that negative results of tests on brain material are not always a sign

of absence of the virus from the salivary glands is proved by the findings in 5 of the author's experiments (*vide supra*), in which virus was shown to be present in the submaxillary gland, but absent from the brain. *G. Stuart*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

VAKE, A. **The Variation of Plague Bacilli (Strain *Pasteurella pestis* EB) in the White Mouse.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 11/12, 1803–6, 2 figs. [Translated from Russian.]

When plague bacilli, virulent or avirulent, are cultivated for long periods on nutrient media their morphological properties undergo a change. The author considered that if the metabolism of the organism is so easily altered its hereditary characteristics can be altered equally easily and he presents a series of experiments in proof of this hypothesis.

In the article the author refers to the typical strain as the R strain and to the strain which has undergone variation as the S strain. From a stock laboratory culture S forms were isolated and passaged through 3 groups of mice. Cultures from these revealed both R and S strains but on the third series passage mainly R forms were produced. These maintained their morphology during subsequent passages up to the ninth through nutrient media and it is claimed that the morphology of the bacilli had undergone a change in the mice and that the morphology of the R form colonies was determined by their heredity. *P. A. Clearkin*

IOFF, I. G. **The Main Results of Parasitological Studies in connexion with the Epidemiology of Plague.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, Nos. 11/12, 1607–15. [Numerous refs.] [Translated from Russian.]

The history of the study of plague in Russia is discussed, with special reference to sylvatic plague and the fleas concerned. Emphasis is given to indicating the different Russian investigators who participated in the researches. This is an interesting paper to read, both for general information and for indications of problems still to be resolved; it is not readily summarized.

It is noted that the progressive work of the past must be invaluable in understanding plague problems which may emerge in opening up new tracts of land for settlement and development. Apart from other animals the habits of susliks and gerbils are of paramount importance, besides fleas, and possibly hard ticks too, in the enzootic-epizootic balance and in the spread of sylvatic plague.

There is a general discussion of the organization required for adequate

laboratory and field researches on plague, for the training of staff, and for coordination and distribution of existing and future information.

D. S. Bertram

KARTMAN, L. **An Insecticide-Bait-Box Method for the Control of Sylvatic Plague Vectors.** *J. Hygiene.* 1958, Dec., v. 56, No. 4, 455–65, 3 text figs. & 4 figs. on pl. [19 refs.]

The chief reservoirs for sylvatic plague in the western United States are considered to be voles and meadow mice which, unlike ground squirrels, could not readily be eradicated on a large scale.

An experiment was therefore carried out from June 1956 to January 1958, in a wildlife reserve near San Francisco, to control fleas on wild rodents by means of DDT. Simply constructed bait boxes were used which ensured that visiting rodents would come into contact with DDT. Live trapping and studies of flea populations on the trapped animals were carried out. Effective flea control was demonstrated, with a residual effect of several months, against the two principal species, *Malaraeus telchinum* and *Hystrichopsylla linsdalei,* both on the animals and in their nests. The predominant rodent in the test area was *Microtus californicus.*

[See also this *Bulletin,* 1958, v. 55, 763 (and relevant note on p. 1108), 1223, for recent work by the author and his colleagues.] *E. R. Nye*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

VAANDRAGER, K. & GRIMM, J. G. **Amoebiasis.** *Nederl. Tijdschr. v. Geneesk.* 1959, Feb. 21, v. 103, No. 8, 400–404.

The English summary appended to the paper is as follows:—

"A description is given of the geographical distribution and epidemiology of amoebiasis. Among K.L.M. personnel, intensive stool examinations after a laxative had been given produced evidence of amoebiasis in an amazing number of cases. Many of these had been suspected for a long time, but no amoebae had ever been found in specimens of faeces not voided in our surgery.

"The deceptive character of the symptoms in many cases of amoebiasis is stressed; a few striking cases are reported in detail. The problems presented by cyst carriers, minuta forms, treatment and prophylaxis are discussed. The authors concluded that amoebiasis is much more frequent in the Netherlands than is generally assumed, and that microscopic examinations of stools should be made more frequently."

ROYAL SOC. PROMOTION HEALTH J. 1958, Sept.–Oct., v. 78, No. 5, 681–84. [28 refs.] Discussion 685–6. **Health Congress at Eastbourne, Apr. 28–May 2, 1958. Tropical Hygiene Section. Public Health Hazards of Amoebiasis in the Light of its Host-Parasite Relations** [HOARE, C. A.].

The concept of aetiological and host-parasite relations in amoebiasis presented in this address was defined as follows. The human entamoebae with quadrinucleate cysts are represented by 3 types, the small non-pathogenic *Entamoeba hartmanni* and two strains of the large *E. histolytica,* one a harmless commensal (*E. dispar* described by BRUMPT, see this *Bulletin,* 1926, v. 23, 35) and the other capable of invading the host's tissues (Brumpt's *E. dysenteriae*). *E. hartmanni* and the non-pathogenic larger race of *E. histolytica* appear to have a world-wide distribution, but the pathogenic race is restricted to warm and hot countries where clinical amoebiasis is endemic. Occasionally this race is introduced into temperate regions where it fails to establish itself. Amoebiasis can now be regarded as a tropical rather than cosmopolitan disease. The speaker then outlined the routes of transmission of the infection and quoted a Russian finding that *E. histolytica* can remain viable for 12 days in concentrations of sodium chloride up to 58·5 gm./litre which is higher than sea water; sewage effluents discharged into the sea may therefore transmit infection.

In the discussion STAMM disagreed with the concept of a pathogenic strain limited to the tropics and of two strains of the large race of *E. histolytica.* Virulence might depend on contact with an inflamed mucosa, and recovery often followed bactericidal preparations which were not directly amoebicidal. Increased virulence might be expected in areas where hygiene was poor and transmission frequent. In a group of 181 Pakistanis studied in Britain 56% were infected with *E. histolytica,* 45% of them with the large strain. Only 1 required treatment for amoebiasis, and the carrier rate in these persons and their associates remained unchanged over 3 years. He related the world distribution of amoebiasis to variations in standards of hygiene.

The speaker in reply suggested that the Pakistanis were infected with an avirulent strain. Further investigation was needed, but one conclusion was not controversial, namely that the public health hazard of amoebiasis was much less than was generally assumed. *T. H. Davey*

NAKAYAMA, A. **Studies on the Culture Medium of** *Entamoeba histolytica. Yokohama Med. Bull.* 1958, Oct., v. 9, No. 5, 290–96.

ISHII and KUTSUMI (*Kiseichu Gakkai Kiji,* 1942, v. 17, No. 5) described a simple culture medium for *E. histolytica* which contained no protein and has been used by the present author as a basic medium (without asparagine) for uncovering growth factors for *E. histolytica.* The solid part consists of 2% agar in Ringer's solution, and is overlaid by 1% sodium citrate in Ringer, to which various substances being investigated were added in 0·05 to 0·1% by weight, and also rice powder. Incubation was carried out at 37°C. and the range of *p*H lay between 6·5 and 7·8. The medium was useful for freeing *E. histolytica* from *Blastocystis hominis* which frequently accompanies it in the faeces. Albumin added to this medium proved very favourable for growth of *E. histolytica,* but globulin did not. The former contains glucosamine and this

substance added alone caused good growth as did gelatin. Glyco- and phosphoproteid but not chromo- or nucleoproteid when added to the medium also aided growth and likewise proteose-peptone and glutathione were beneficial but not glycyl peptides. *J. D. Fulton*

SHAFFER, J. G., SCHULER, R. W. & KEY, Iris D. **Studies on the Growth Requirements of *Entamoeba histolytica*. The Ingestion of Altered Bacterial Structures by *E. histolytica* in the Shaffer-Frye Medium.** *Amer. J. Trop. Med. & Hyg.* 1958, May, v. 7, No. 3, 302–8, 1 fig. [12 refs.]

Previous work by the senior author and his associates [see, for example, this *Bulletin,* 1953, v. 50, 112] has shown that in cultures of *Entamoeba histolytica,* grown in the Shaffer-Frye medium (S-F) in the presence of a streptobacillus (probably *Bacteroides* sp.) and penicillin, the bacteria play an important part in the propagation of the amoebae. However, nothing is known about the way in which the necessary material is obtained by the amoebae from the bacteria or of the nature of this material. The present paper deals with experiments designed to solve the first part of the problem.

Having failed to demonstrate the ingestion of bacteria by the amoebae by examination of fixed and stained preparations, the authors decided to study the amoebae in fresh preparations by dark field microscopy. Preliminary observations of the bacteria, cultivated in S-F medium with penicillin, by this method revealed the formation on the surface of the bacilli of round bodies, the production of which is attributed to the presence of the antibiotic. When cultures of *E. histolytica* were examined by the same technique, it was found that the amoebae ingested these round bodies in proportion to the numbers of them available. That these bacterial bodies supplied the amoebae with the necessary growth factors was demonstrated by experiments with 6 strains of the streptobacillus grown in S-F medium. These strains varied considerably in their ability to support growth of the amoebae and in the production of round bodies. It was found that the latter were not present in variants unfavourable to the growth of amoebae, and in fact there was a parallelism between the ease with which the amoebae could be cultivated and the ability of the different variants of the bacillus to produce the round bodies. It was also shown that variants not producing these bodies were more resistant to the action of penicillin than those producing them. *C. A. Hoare*

RICCIARDI, M. L. & GOZZI, E. Studi sulla biologia di *E. histolytica.* III. Utilità del metodo di Chang per l'incistamento *in vitro* di *E. histolytica.* [**Studies on the Biology of *E. histolytica.* III. Employment of Chang's Method for Encystation of *E. histolytica in vitro***] *Riv. di Parassit.* Rome. 1958, July, v. 19, No. 3, 169–73. English summary (4 lines).

The authors have made a comparative study of 3 methods for inducing encystation of *Entamoeba histolytica in vitro.* For this purpose 7 strains of the amoeba were cultivated by methods devised by DOBELL and LAIDLAW [this *Bulletin,* 1927, v. 24, 363], STONE [*ibid.,* 1937, v. 34, 324] and SHI LU CHANG [*ibid.,* 1944, v. 41, 217; 1947, v. 44, 83].

The best results were obtained with Chang's method, which ensured regular and abundant crops of mature and viable cysts, obtained from all the strains tested.

C. A. Hoare

HARINASUTA, C. & MAEGRAITH, B. G. **The Demonstration of Proteolytic Enzyme Activity of *Entamoeba histolytica* by the Use of Photographic Gelatin Film.** *Ann. Trop. Med. & Parasit.* 1958, Dec., v. 52, No. 4, 508–15, 1 fig.

Earlier experiments by the authors (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1954, v. 48, 285), in which they used living cultures of *Entamoeba histolytica*, or extracts of these parasites, in presence of gelatin on exposed and developed photographic film, had indicated that they possessed proteolytic activity. It was not clear then, however, what part accompanying bacteria played. The present experiments have been carried out with 2 strains of *E. histolytica* accompanied respectively by a mixed bacterial flora or by *Escherichia coli* alone, in presence or absence of rice starch. It was found that living amoebae from both cultures containing 100,000 parasites per 0·1 ml. of suspension brought about complete digestion of gelatin within 1½ hours, but did not do so when only 12,500 were present. On the other hand washed suspensions of the accompanying bacteria did not digest gelatin, nor did the medium in which amoebae had been suspended for 2 hours. Saline extracts of large numbers of frozen and thawed amoebae brought about digestion over the *p*H range 6·0 to 8·0 and the demonstration could be completed in 2 hours.

J. D. Fulton

NAKAMURA, M. & EDWARDS, P. R., Jr. **Casease in *Entamoeba histolytica*.** [Correspondence.] *Nature.* 1959, Feb. 7, v. 183, 397.

The casein-hydrolysing proteolytic enzyme, casease, has been found in many bacteria but not up to now in *Entamoeba histolytica*. It is suggested that this may have been due to comparatively large quantities of casein in the assay plates, and the authors, from Montana State University, have repeated the experiments with smaller concentrations of casein.

Amoebae were cultivated in coagulated egg slants with a Ringer-liver extract overlay. 72-hour cultures were pooled and washed four times in saline and the supernatant from the last washing was also tested for enzyme activity, since it would contain any remaining associated bacteria from the stock cultures of amoebae. Also, the associated bacteria were tested for casease activity in the absence of the amoebae.

For assay, large drops of the material were placed on 1·0% agar plates containing 0·2% casein and these were incubated at 20°–25°C. for 12 hours, after which the plates were flooded with a protein-precipitating agent (a solution of mercuric chloride and hydrochloric acid). Casein hydrolysis was indicated by the presence of clear areas in the opaque casein-agar plates.

Casein was shown to be hydrolysed by 2 strains of *E. histolytica* (large race HUS-105 and small race Washington). Neither the supernatant from the fourth washing nor the cultures of the associated bacteria themselves hydrolysed casein. The amoebic casease was destroyed by heating at 65°C. for 5 minutes,

but not at 55°C. for the same period. The enzyme was active at *p*H 5 to *p*H 8. The authors point out that these experiments on the proteolytic activity of amoebae may yield clues on the mechanisms of pathogenicity of the parasite [this *Bulletin,* 1955, v. 52, 780 ; 1957, v. 54, 429 ; 1958, v. 55, 42].

H. J. O'D. Burke-Gaffney

MAGAUDDA-BORZI, L. & PENNISI, L. La sierologia dell'amebiasi. III. Valutazione comparativa di alcuni antigeni grezzi, estratti da *E. histolytica* con varie metodiche. [**The Serology of Amoebiasis. III. Comparative Evaluation of Various Raw Antigens extracted from** *Entamoeba histolytica* **by Different Methods**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, Oct., v. 39, No. 10, 616–26.

The English summary appended to the paper is as follows:—

" Suspensions of trophozoites of E. histolytica (Lero strain) grown on Boeck and Drbohlav's medium and in Cleveland and Collier's medium, according to Frye and Meleney's technique, were employed by the authors for the extraction of the raw antigen material by cryolysis (5 times at −20° C and at −70° C ; 15 times at −20° C and treatment by ultrasounds (I h with 100 kc at 3 watts sq/cm).

" Comparative tests carried out on the different antigens by two anti-amoeba immune serums showed that the cryolysate at −20° C, 5 times and the antigen treated by ultrasounds (both obtained from suspensions of trophozoites grown on BD medium) give the best results both from the sensitivity and the specificity point of view."

KASLIWAL, R. M. & MATHUR, M. S. **Adrenal Cortical Hypofunction in some Cases of Chronic Amoebiasis.** *J. Indian Med. Ass.* 1958, Dec. 16, v. 31, No. 12, 477–80. [14 refs.]

The authors found adrenal cortical function to be defective in 9 patients with amoebiasis whom they considered on clinical grounds to manifest deficiencies in this function. They regard the two conditions as being related ; under " anti-amoebic and general lines of treatment " the patients' condition improved. They offer suggestions as to the genesis of the relationship. *A. R. D. Adams*

CORNET, L. Les stades anatomiques de l'abcès du foie. Importance clinique et thérapeutique. [**The Anatomical Stages of Liver Abscess. Clinical and Therapeutic Importance**] *Méd. Trop.* Marseilles. 1958, Nov.–Dec., v. 18, No. 6, 869–87, 6 figs. [16 refs.]

The author's surgical experience does not support the belief of some modern authors that before amoebic liver abscess formation there is a general diffuse hepatitis. Very early operative interventions in 24 patients confirm earlier teaching that the initial lesions are local and focal and not generalized. Early acute abscesses are amenable to medical treatment ; if they are not completely cured chronic encysted or caseous abscesses ensue ; these demand surgical relief. Details of these cases are cited to illustrate these and other features of the condition. *A. R. D. Adams*

FALCONER, Dora J. B. **Ruptured Amoebic Liver Abscess presenting as a Perforated Peptic Ulcer.** *West African Med. J.* 1958, Sept., v. 7 (n.s.), No. 3, 154–6.

ARU, L. & ZAMBELLI, P. Azione *in vivo* del semicarbazone del 5,6-chinon 4,7-fenantrolina sugli enterobatteri di amebiasici. ["*In vivo*" **Activity of Semicarbazone 5,6-quinone 4,7-phenanthroline on Intestinal Bacteria in Amoebiasis Patients**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, Oct., v. 39, No. 10, 639–58, 7 graphs. & 7 figs. [14 refs.] English summary.

In the belief, for which many authorities are quoted, that the nature of the intestinal flora influences the pathogenic behaviour of *Entamoeba histolytica,* the authors studied the effects on it of a new synthetic product, 5,6-quinone 4,7-phenanthroline (Ciba 11925), recently described as a powerful amoebicide [this *Bulletin,* 1959, v. 56, 163 *bis*].

7 patients were observed, 4 of whom had blood and mucus in the stools and many vegetative amoebae, while in 3 the only complaint was a slight intestinal disturbance, with a few vegetative and encysted amoebae in the faeces. The drug was administered at a dose of 200–400 mgm. per day. One patient received 500 mgm. for 12 days.

Counts of the intestinal bacteria were made by culture on Tryptose-agar after 36 hours' incubation and the number was related to the dry weight of the faeces. Numerical changes in the various species of bacteria making up the intestinal flora were rather irregular. In 4 patients there was a sharp fall in the total number, in 1 patient a notable increase, and in 2 there was no significant change. *Escherichia coli,* which appeared to be the most sensitive to the drug, showed decrease in 3 patients, eventually almost disappearing completely, in 3 patients there was a slight increase, and in 1 there were irregular findings. Initially in 3 of the patients with acute disease the number of bacteria was notably high, while this was the case only once in 3 chronic patients. The amoebae disappeared in all 7 patients after treatment. The authors consider that the drug might be acting, at least partly, indirectly through bringing about a decrease in the flora. Easily intelligible graphs and tables are given for each case.

[The number of cases on which these tentative conclusions are based is certainly very small.] *E. Agius*

PEZZULLO, C. & TEDESCHI, G. Rilievi clinici sul trattamento dell'amebiasi intestinale con la 5,6 chinone-4,7 fenantrolina. [**Intestinal Amoebiasis treated with 5,6 quinone-4,7 Phenanthroline; Clinical Report**] *Acta. Med. Italica.* 1958, May, v. 13, No. 5, 126–8.

17 patients [ages not given] with amoebiasis proved by faecal and sigmoidoscopical examination have been treated in the Infectious and Tropical Disease Clinic at Naples with the above drug, which is also known as 11925C. 5 patients had acute infections and the remainder had chronic infections and had already been treated with various amoebicidal drugs.

The drug was given as 50 mgm. tablets in the dosages varying as follows:— (A) acute: from 200 mgm. per day for 12 days up to 400 mgm. for 12 days,

or 300 mgm. for 20 days; (B) chronic: from 200 mgm. for 12 days to 400 mgm. for 18 days. A further course of treatment was necessary in 2 patients with acute and 4 with chronic amoebiasis, and relapses were not related to the dosage. Some of the patients had hepatitis, but neither this nor the colonic pain was influenced by the drug. On the whole it was well tolerated and its amoebicidal action was rapid, constant and lasting. It has a definite anti-diarrhoeic action, probably through its action on the intestinal bacterial flora. Its use can be advised in both acute and chronic amoebiasis.

[The longest period of subsequent follow-up is not given though some cases were negative after 6 months.] *W. K. Dunscombe*

Abdallah, A. & Saif, M. **5,6-Quinone-4,7-Phenanthroline and its Semicarbazone in the Treatment of Acute and Chronic Intestinal Amoebiasis.** *J. Egyptian Med. Ass.* 1958, v. 41, Nos. 7/8, 334–41.

The authors [without acknowledgements or references] recapitulate the properties of these compounds [one is listed under the trade designation 11925C or Entobex (Ciba); see this *Bulletin,* 1958, v. 55, 892, 1115, 1117, 1226; and 1959, v. 56, 163 *bis,* 164 and 165].

They have treated patients in Egypt with acute or with chronic amoebiasis with one or other drug; they conclude that they are more effective in the chronic than in the acute disease—"The effect on the cysts was more satisfactory in the case of both drugs than that on the vegetative forms." Toxic side-effects were trivial.

The results are described fully, but in somewhat concentrated form and without tabulation, but it would appear from the text that more than 100 patients were treated. *A. R. D. Adams*

Nohmi, N. Novas substâncias do grupo das quinono-fenantrolinas no tratamento da amebiase intestinal. [**New Substances of the Quinone-Phenanthroline Group in the Treatment of Intestinal Amoebiasis**] *Rev. Assoc. Med. Minas Gerais.* 1958, Mar. & June, v. 9, Nos. 1/2, 75–82, 2 figs.

The English summary appended to the paper is as follows:—

"The author selected 20 patients with intestinal amoebiasis one of whom showed the clinical symptoms of the acute form; these 20 patients were submitted to treatment with 11'925 and 11'925-C products, new substances of the quinono-phenanthroline group.

"The efficiency of the treatment could be measured by the disappearance of the trophozoites in the case of acute amoebiasis and of the cysts in the faeces of the other 12 cases which were kept in hospital under observation for a satisfactory period of control. In the other 7 cases (1 or 35% of the total number) the cysts reappeared after about one month but as these cases were treated in the ambulatory clinic we were unable to exclude the possibility of re-infection.

"The most easily tolerated useful dose was 600 mg to 1·2 g daily during a period of 10 days, i.e. 20 mg per kilogramme of body weight.

"The above results, the clinical improvement observed, and the satisfactory

tolerance of the drugs, all seem to suggest their use in a greater number of cases in order to arrive at more reliable conclusions."

[See this *Bulletin,* 1958, v. 55, 1329 ; 1959, v. 56, 163, 164.]

De Carneri, I. Due nuovi antiamebici: la N-(β-ossietil-N)-[p-fenossi (4′-nitro)-benzil]-dicloroacetamide ed il suo etere etilico. [**Two New Amoebicides: N-(β-oxyethyl-N)-[p-phenoxy (4′-nitro) benzyl]-dichloroacetamide and its Ethylic Ether**] *Giorn. di Malattie Infettive e Parassit.* 1958, Sept., v. 10, No. 9, 850–52. [19 refs.]

N-(β-oxyethyl)-N-[p-phenoxy (4′-nitro)-benzyl]-dichloroacetamide and its ethylic ether are found *in vitro* to be strongly lethal towards *Entamoeba histolytica* in the trophozoite stage in concentrations of 0·25 and 0·03 μgm. per ml., respectively, being many times more potent than emetine and other amoebicides. While they also act on other amoebae, they are inactive on a wide range of bacteria, fungi, protozoa, and helminths. The dichloroacetamide has been found to act in intestinal amoebiasis in rats at doses ranging from 10 to 60 mgm./kgm. In amoebic liver abscesses in the golden hamster it is only active at doses of 250–500 mgm./kgm. (chloroquine is active at doses of 150 mgm./kgm.). This may depend on relatively poor absorption through the intestine.

Both drugs are of very low toxicity and tolerance tests in man have given good results. Clinical trials are in progress in Greece and India, and results so far are promising.

[See also this *Bulletin,* 1958, v. 55, 894, 1013.] *E. Agius*

DeMello, E. R. & Patel, J. C. **A Preliminary Clinical Trial of Bacitracin and its Combination with Streptomycin in Amebiasis.** *Indian J. Med. Sci.* 1958, June, v. 12, No. 6, 455–7.

"Bacitracin alone has not been uniformly satisfactory. Streptomycin in combination with bacitracin enhances the activity of the latter as an amebicidal agent. 9 out of 11 cases treated with a combined preparation 'Strebacin' were apparently cured."

Staninec, M. Střevní amébiasa I. část: K problému diagnosy střevní amébiasy na základě zkušeností se 155 hospitalizovanými nemocnými. [**Intestinal Amoebiasis. I, II and III**] *Časopis Lékařú Českých.* Prague. 1959, Feb. 6, v. 98, No. 6, 170–73. II. část: Srovnání výsledků emetinové a antibiotické léčby u 155 nemocných střevní amébiasou. *Ibid.,* 173–6, 1 fig. III. část: Vztah askariasy ke chronické střevní amébiase. *Ibid.,* 176–8. [21 refs.]

The English summaries appended to the papers are as follows:—

I. "By the way of introduction a brief account is given of recent advances in the world literature on the pathogenesis and epidemiology of intestinal amoebiasis. Subsequently the author's own experience with 155 cases of the disease are described. The paper concentrates on diagnostic problems. The difficulties encountered in the differential diagnosis of amoeboid and chronic

bacillary dysentery are stressed. Comprehensive clinical, bacteriological, parasitological and rectoscopic examinations are necessary. Contrary to data hitherto published in the literature, the significance of amoeboid cysts in the faeces in those patients where after repeated examinations no E. h., forma magna, are found and where bacteriological findings are persistently negative, is stressed."

II. " The experience with the therapy of 155 cases of amoebiasis has shown that terramycin is a more successful drug than emetine. Emetine combined with yatren, however, gave also good results, better results than when emetine was combined with sulphonamides. Further the need of general therapy with vitamins, infusions, blood and plasma transfusions and long-term dietotherapy are stressed. Ascariasis frequently causes symptoms which simulate intestinal amoebiasis and may account for some adverse therapeutic results. It is therefore recommended that treatment of ascariasis should be a part of the therapeutic programme of amoebiasis."

III. " It appears that there is a relationship between ascariasis and the chronicity and possibilities of recurrence in gastrointestinal amoebiasis. Round worms and their eggs irritate the intestinal mucous membrane mechanically, by toxins, allergically, and affect gut interoreceptors. There is resulting disturbance of innervation. There is also a general toxic effect, as well as a nutritional effect from the presence of worms in the gut absorbing nutrients.

" In 76 out of 77 patients with amoebiasis and ascariasis, where the latter was eliminated by therapy, subjective complaints—abdominal pain, anorexia, tenesmus—disappeared and the patients improved more rapidly than a group of 60 patients without anthelmintic treatment.

" Amoebic cysts were not found in the worms.

" Successful therapy of amoebiasis involves simultaneous treatment of ascariasis, even if the patient will later return to the same infected environment."

McConnachie, Elspeth W. **Factors affecting the Growth and Behaviour of Axenic Strains of *Entamoeba invadens* Rodhain, 1934.** *Parasitology.* 1958, Nov., v. 48, Nos. 3/4, 423–32. [20 refs.]

The author describes the cultivation of 2 bacteria-free (axenic) strains of the reptilian parasite, *Entamoeba invadens,* with special reference to the physico-chemical and tissue factors affecting their growth *in vitro.* When isolated in culture, the amoebae were grown with a mixed flora, which was eliminated by treating cysts first with potassium permanganate and subsequently by cultivating them in the presence of penicillin and streptomycin. After the absence of bacteria was verified by negative subcultures in appropriate media, axenic cultures were maintained in a medium composed of sterile saline and a slice of sterile rat liver. In this medium growth of the amoebae is poor and only scanty cysts are formed. The optimum conditions of growth were found to be at 24°C., with NaCl concentration of 0·75–1·0% and *p*H 5·7–6·1. The source of liver in the culture (rat, chicks or hamster) proved to be unimportant, but other tissues (*e.g.,* rat kidney, muscle, lung, spleen) did not support growth

in serial cultures. Though liver is the only suitable tissue, its growth-promoting property is destroyed by centrifugation, autoclaving and filtration.

The results obtained with *E. invadens* are compared with the growth requirements of *E. histolytica*. It was found that the latter cannot be grown in the axenic saline-liver medium, in spite of the fact that this parasite produces infection of the liver. On the other hand, other workers have shown that the human entamoeba will grow in media containing chick embryo tissue or its juice [this *Bulletin*, 1954, v. 51, 267; 1957, v. 54, 1081]. The author concludes that "The nutritional differences between *E. invadens* and invasive strains of *E. histolytica* are presumably greater than might be deduced from observations of their behaviour in their respective hosts". *C. A. Hoare*

YAWS AND OTHER TREPONEMATOSES

Barrow, J., Wallace, H. J. & Nicol, C. S. **A Case of Early Yaws.** *Brit. Med. J.* 1959, Feb. 14, 420–21, 1 fig.

"A boy aged 10 from Dominica developed an ulcer on his ankle during the voyage to this country [Britain]. Some weeks later crusted papules appeared on the scalp and trunk, and *T. pertenue* was demonstrated in the serum from one of these lesions. Price's precipitation test and Reiter's protein complement-fixation test were positive in the blood. A diagnosis of early infectious yaws was made; the lesions responded quickly to treatment with penicillin."

Marroquin, J. Distribución geográfica y frecuencia del pián en el Perú. [**Distribution and Incidence of Yaws in Peru**] *Rev. Peruana de Salud Publica.* Lima. 1956, June, v. 5, No. 2, 205–210, 1 map. English summary.

In Peru, yaws is confined largely to the jungle areas of the Amazon basin and particularly the departments of Loreto, San Martin and Madre de Dios, where in 1954 the incidence was 200 cases per 100,000 population. The total numbers of cases between 1951 and 1955 in Loreto, San Martin and "other departments" were, respectively, 3,143, 1,312 and 55. Figures are given for the same period in respect of 26 districts.

It is stated that in 1943 the health centre in Iquitos recorded an incidence of 6% among 3,592 persons examined, the highest incidence being in girls aged 10 to 14. Owing to difficulties in getting in touch with this sylvatic population the eradication campaign has not yet begun. It is added that half of the patients suffering from yaws show no physical signs and the disease can be recognized on serological grounds alone. *H. J. O'D. Burke-Gaffney*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

RICHTER, R. & TAT, L. **Leprosy Problems in Turkey.** *Internat. J. Leprosy.* New Orleans. 1958, Apr.–June, v. 26, No. 2, 134–43, 2 figs.

The Ministry of Health reports from Turkey show 510 cases of leprosy from January 1950 to December 1954. This, while not giving any clear idea of the total number in the country, does indicate to some extent the distribution of the disease. In a population of 23 millions a figure of 500 patients gives a little more than 0·02 per 1,000. Judging by experiences in other countries 10 to 12 thousand patients should be more correct. The disease is shown on a map to be most common in the south-eastern and eastern areas, but there are also smaller endemic areas in Central Anatolia and in vilayets in the north and south-west.

The types of cases are 56·3% lepromatous, 2·1% tuberculoid, 26·7% indeterminate, and the rest uncertain.

There are 229 patients in the Elazig leprosarium, and a particular description is given of these. Dividing them according to 5-year age-groups, 21–30 is the largest with 72 patients.

Regarding final control of the disease it is considered that " If the main work of leprosy census . . . is not done in the villages, these conditions will not be changed and the disease in the endemic districts will not lessen. For discovering cases a sufficient number of well-trained doctors is necessary ". A hope is expressed that in Turkey where so much progress has been made in combating malaria and venereal diseases leprosy will ultimately be dealt with on a large scale. *Ernest Muir*

RANADIVE, K. J., NERURKAR, R. V. & KHANOLKAR, V. R. *In vitro* **Studies on Human Leprosy—I.** *Indian J. Med. Sci.* 1958, Oct., v. 12, No. 10, 791–6, 7 figs. on 2 pls.

Spinal ganglia and skeletal muscles were removed aseptically from 10- to 20-weeks-old human embryos and placed in Simm's balanced salt solution. Hanging drop preparations were made in plasma clot, and 2 ganglia explants were cultivated on each round coverslip for 3 or 4 days. Similar cultures were made of foetal muscle. Small fragments of fresh lepromatous nodules, after having been washed in penicillin and streptomycin, were added, one to each coverslip containing 2 explants of spinal ganglia, at a distance of about 10 mm. After 72 to 96 hours it was found that 78% of spinal ganglion cultures " showed fibrocytes full of acid-fast rods, granular material, diffuse foamy substance or faint pink coloration of the cytoplasm. Such findings were very rare in skeletal muscle fibrocytes ". *Ernest Muir*

GOKHALE, B. B. & KURKURE, N. B. **Phenol Red Excretion Test of Kidney Function in Leprosy Patients.** *Indian J. Med. Sci.* 1958, May, v. 12, No. 5, 331–3.

"The phenol red excretion study in leprosy patients during the reaction and quiescent phases indicates impaired excretion of the dye.

"The low excretion values were particularly observed in reaction and they tended to rise in quiescent phase. Low and sustained values were also noted indicating rigidity of function.

"The role of impaired kidney function in the genesis of edema in reaction is discussed."

De Montaigne, E. L. & Hill, K. R. **A Study of the Blood in Leprosy: Cytology and Clotting.** *West Indian Med. J.* 1958, Sept., v. 7, No. 3, 195–9, 4 figs. on pl. [13 refs.]

The authors, in Jamaica, were led, by the apparent anomaly of (a) lack of bleeding from surgical incisions and (b) severe nose-bleeding, in leprosy patients to make a study of the blood in leprosy. 90 leprosy patients were examined, all of whom except 2 had been under sulphone treatment. 80% of the male patients and 60% of the females had anaemia, irrespective of the type of the disease. Hospital records showed a tendency to hypochromic, normocytic type of anaemia. Eosinophilia was present in 40%, but this is considered to be due to hookworm as 64% of these patients were infected with hookworm which was found in only 5% of patients without eosinophilia. It is suggested that the anaemia may be due to the sulphone treatment [why not to the hookworm ?]. No marked abnormality in the number of platelets was found although there was a tendency to thrombocytopenia, and bleeding times appeared to be shorter than usual, although clotting and prothrombin times were within the normal limits. Also bleeding from the nose was not uncommon.

The conclusion arrived at is that bleeding from surgical wounds is due not to the composition of the blood but possibly to compression of the capillaries by the infiltrating macrophages and endarteritis obliterans in some cases: in others this factor may cause stoppage of bleeding. This matter is to be investigated further. *Ernest Muir*

Bush, O. B., Jr. **C-Reactive Protein in Leprosy.** *Internat. J. Leprosy.* New Orleans. 1958, Apr.–June, v. 26, No. 2, 123–6.

C-reactive protein (CRP) in blood serum precipitates with the somatic C polysaccharide of the pneumococcus, but does not appear in the sera of healthy people. As there had been positive findings of CRP in tuberculosis, the author thought of trials in leprosy.

In 31 patients with neural leprosy 35% gave positive findings. In 73 patients with nodular leprosy 53% gave positive findings. Of the 24 whose CRP reactions were over 1 plus only 11 had complications such as trophic ulcers. The sedimentation rate was raised in only 19 of the CRP-positive patients.

The author considers that this test will be used in future to determine when the patient has fully recovered. *Ernest Muir*

PLANCHET, L. Les résultats faussement positifs des réactions sérologiques aux antigènes cardiolipidiques dans la lèpre. Etude biologique et pathogénique. [**The False Positive Results of the Serological Reactions with Cardiolipin Antigens in Leprosy. A Biological and Pathological Study**] *Maroc Méd.* 1958, Nov., v. 37, No. 402, 1113–29.

With the cardiolipin antigen, the author found the serological reactions positive in 43% of 515 leprous patients, while in the general Moroccan population the proportion of positives was only 20%. Positivity seems to be most frequent in proportion to the severity of the disease, and has a relationship to the albumin-globulin content, as shown by the electrophoretic method. In contrast to these results leprosy does not have a similar influence on the immobilization test of Nelson. The cause of the false positive results with cardiolipin antigen is not yet properly understood. The results of this very full study are shown in detail in many tables and 2 graphs. *Ernest Muir*

ARVELO, J. DE J., MOLINENGO, L. & PÉREZ PÉREZ, B. Estudio sobre el empleo de leprominas diluidas para el control inmunológico de contactos Mitsuda positivos. Experiencia realizada en la Leproseria de Providencia y el servicio antileproso del Estado Zulia. [**A Study of the Employment of Dilutions of Lepromin for the Immunological Control of Mitsuda-Positive Contacts. Results obtained in the Leprosarium of Providencia and in the Anti-Leprosy Service of the State of Zulia, Venezuela**] *Rev. Sanidad y Asistencia Social.* Caracas. 1958, Jan.–Apr., v. 23, Nos. 1/2, 29–38. [11 refs.]

The object of this investigation was to economize in the amount of lepromin used because of the limited amount available. Three dilutions of standard lepromin were used: 1 in 400, 1 in 9,600, and 1 in 19,200. It was found that with these dilutions the early (Fernandez) reaction was not obtained except in a few instances, but the late (Mitsuda) reaction was obtained in most.

92 subjects who had been in contact with leprosy were chosen, some from the town and some from the country, all with known 2-plus or 3-plus Mitsuda reactions. The 47 2-plus contacts were injected intradermally with 0·1 cc. of standard and of the first dilution simultaneously; the 45 with 3-plus reactions were injected with the same amounts of the second and third dilutions. In the former group, 11·3% of the 44 readings made showed no Mitsuda reaction. In the second group, dilutions II and III failed to give reactions in 33·3% and 58·3% respectively of 36 readings.

The authors suggest using the standard lepromin only for first tests, and subsequently using 1 in 400 dilutions for subjects with a 2-plus reaction, and 1 in 9,600 dilution for those with a 3-plus reaction. *Ernest Muir*

TRAPPMANN, R. **A Study of the Lepromin and Tuberculin Reactions. The Correlation between the Two Reactions and the Influence of BCG Vaccination on Nonreactors in Healthy Leprosy Contact Children in Djakarta.** *Internat. J. Leprosy.* New Orleans. 1958, Apr.–June, v. 26, No. 2, 102–10. [12 refs.]

In Djakarta 901 healthy children who had been in contact with people with leprosy were tested for their lepromin and tuberculin reactions.

Taken as a whole, 61% of the former and 30% of the latter were positive. But as the children grew older the number of positive results increased much more rapidly in the tuberculin than in the lepromin reactions. This was considered to be due to the younger children having had contact with leprosy alone, while the older children had also had contacts with tuberculosis. The two reactions were simultaneously positive or negative in 59%. In reactions which disagreed the largest group was the tuberculin-negative Mitsuda-positive. Both tests were positive in 25, 47 and 52% of age-groups 1–5, 6–10, 11–15; and tuberculin positive with Mitsuda negative in 6, 15 and 72%. As out of 277 tuberculin positives 83% were also Mitsuda positive it is considered likely that some of the latter were due to tuberculous infection. There was a correlation between the Fernandez and Mitsuda reactions in 22%, but 40% of positive Mitsudas occurred when the Fernandez reaction was negative. BCG inoculation made 65% Mitsuda-negatives positive, but it only made 23% tuberculin-negative children reactive to tuberculin.

It is concluded that if a positive Mitsuda produced by BCG has the same significance as a naturally occurring one then a 65% lepromin conversion rate after BCG inoculation would be of great value in the prophylaxis of leprosy.

Ernest Muir

MONTESTRUC, É. Évolution de l'intradermo-réaction léprominique au cours de la vaccination par le B.C.G. [**Evolution of the Lepromin Intradermal Reaction in the Course of BCG Vaccination**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 472–3.

6 workers at leprosy institutions and in contact with leprosy patients were tested for the Mitsuda reaction. 5 of them gave a strongly positive reaction; but the sixth, a young West Indian of 22 years, was negative to lepromin though positive to tuberculin. After another lepromin test she was again negative to both the early and the late readings. The next day, after a negative radiological report, she was inoculated with BCG (0·01 mgm. intradermally), with the result that at the site of inoculation there was a small reaction which disappeared in some 10 days. However, 46 days after the last lepromin injection there appeared on the site of that (lepromin) injection a nodule which gradually increased to the size of 6 mm. diameter.

This same procedure is recommended in all cases with a negative lepromin and positive tuberculin reaction; only it is important to give a second lepromin test some 2 months after the first before deciding to inoculate BCG.

Ernest Muir

i. BRESANI SILVA, F. Sindrome neural en lepra. Su estudio en 400 casos. [**Neural Syndrome in Leprosy. Its Study in 400 Cases**] *Rev. Peruana de Salud Publica.* Lima. 1956, June, Sept. & Dec., v. 5, Nos. 2, 3 & 4, 79–204; 229–340; 379–501: 1957, Jan.–June, v. 6, Nos. 1/2, 1–116, illustrated. [156 refs.] English summary.

ii. SIGALL MONTENEGRO, O. Profilaxia de la lepra. [**Prophylaxis of Leprosy**] *Ibid.*, 1956, Dec., v. 5, No. 4, 503–4.

i. This thesis occupies 477 pages, and is spread over 4 numbers of the *Revista Peruana de Salud Publica.* A summary and conclusions occupy 31

pages and translations of the latter also appear in French and English. The findings are from a study of 400 patients in the Colonia de San Pablo, an institute for leprosy patients in the north-east of Peru. Of the patients 71% were males and 99% were of mixed race. The largest numbers of patients were in the 20–29 years age-group (22·7%) and 30–39 age-group (25·2%).

In 54·7% the disease had begun with neural symptoms. Of these, changes in sensibility had initiated the neural signs in 85%. The authors show originality by describing 4 stages in the onset of disorders of sensation: thermic, pain, tactile, deep sensation, each of these being added in succession.

Two types of neural lesions are described: those connected with skin lesions, and those unrelated to skin lesions. The latter lesion, " the bundle type ", is considered the more important, and is described in detail. It starts in the terminal nerve fibres in the distal parts of the limbs and gradually spreads proximally tending gradually to cover the chest and abdomen. It affects certain zones in preference to others. At the same time this bundle type spreads from the surface to the deeper tissues, gradually affecting the nerve supplies of muscle, tendon and bone. Its distribution topologically does not resemble the peripheral truncal type but rather the spinal type. Among the patients as a whole 33·7% showed loss of deep sensation, but in patients who had had the disease for over 20 years this was increased to 79·5%. Details are given of the degree in which various forms of deep sensation (such as sensibility to vibration, weight, etc.) are involved.

Of the 400 patients 76·5% showed motor nerve changes, especially in the limbs and face. The nerves most affected were in this order: the ulnar, median and radial in the upper limb, and the external and internal popliteals in the lower. In the face the facial (VII) nerve was most affected, especially the temporal branch.

In 76·5% of the patients reflexes were affected: in 52·7% the deep reflexes were involved and in 84·7% the superficial reflexes. Deep involvement was in the following order of frequency: Achilles tendon, patellar, plantar, radial, ulnar and supraorbital. The loss of superficial reflexes was, in order of frequency, as follows: plantar, cremasteric, abdominal, conjunctival and corneal. Increased reflexes were found only in particular activity of the disease or in lepra reaction.

Of the peripheral nerves involvement was in this order of frequency: ulnar, external popliteal, supraorbital, radial and great auricular. In the lepromatous type the nerve becomes thickened, hard and cylindrical; in the tuberculoid the thickening takes the form of a spindle or a string of beads and becomes caseous and may form fistulas. There is no relationship between the amount of thickening and the degree of loss of function.

There was muscular wasting in the hands, feet and face of 63·2% of patients. Generally the hands were first affected, then the feet, and lastly the face. The muscles first involved were generally the interossei.

There were tendon retractions in 59·2% of the patients with neural disorders, the fingers being first and most affected. The author found that motor disorders were first in order, followed by amyotrophy and then tendon retraction.

Vasomotor disorders were found in 27·0% of the patients, chiefly in the distal parts of the limbs, and earlier and more frequent in the feet than in the hands. In 57·4% there was cyanosis, in 63·8% oedema, and in 2·7% there was elephantiasis. These disorders are due to lesions of the automatic nerve

branches. There was segmental anhidrosis in 92% of the patients, in rare cases the whole of the body being affected. Compensatory hyperhidrosis may be present in other parts of the body.

Trophic ulcers were present in 47·5%, almost always in the feet. 64% of the patients had alopecia, mostly in the eyebrows and eyelids, but also in the limbs, axillae and pubes; alopecia of the scalp was very rare.

There were trophic disorders of the bones in 43%, almost always in the hands and feet. The causes given are the neurotrophic factor due to involvement of autonomic nerve fibres, direct action of the bacilli on the bone, and secondary pyogenic infection. [Nothing is said of the effect of excessive pressure consequent on anaesthesia of the parts.]

It was found that in more than half the patients there had been neural disorders for up to 4 years before skin signs began, and that there were sensory before motor disturbances. The sensory disorders began in the lower limbs, spread to the upper limbs and thence to the head and chest, whereas the motor changes began in the upper limbs, spread to the lower limbs and then to the chest. Generally, perforating ulcers begin long before there are trophic changes in the bones.

The whole work is one of great thoroughness, and great detail is given in the 368 tables with which the text is supported. It should be studied in the original, especially by doctors interested in leprosy in South America.

ii. A short article is added by O. S. Montenegro on the prophylaxis of leprosy. He says that in countries like Peru where leprosy is comparatively recent the lepromatous form of the disease is most common, whereas in places like Brazil where it has been present for a longer time the tuberculoid and undifferentiated forms are proportionately more common. He recommends the following measures for control: (1) internment centres for open cases; (2) dispensaries for the treatment of lepromatous patients who have become negative, and for other non-infectious patients, and from which early cases can be discovered and brought under early treatment; (3) preventoria for the children of infectious patients; (4) centres for vaccination with BCG. Means must be taken also to educate the public in the nature and prevention of leprosy. *Ernest Muir*

Cochrane, R. G. & Khanolkar, V. R. **Dimorphous Polyneuritic Leprosy.** *Indian J. Med. Sci.* 1958, Jan., v. 12, No. 1, 1–9, 6 figs. on 2 pls.

5 patients with leprosy showed sensory symptoms, but there were no lesions of the skin. They were therefore classified as neural or polyneuritic; and, as histological examination of nerve tissue showed both foamy cells (indicating lepromatous leprosy) and tuberculoid foci, they were further classified as dimorphous [this *Bulletin,* 1956, v. 53, 1434].

The authors contend that the dimorphous group is more widespread and numerous than was formerly thought. They consider that infection takes place through the epithelium of the skin, and that the bacilli are first taken up by the Schwann cells at the level of the prickly cell layer, that the Schwann sheath bulges out and ultimately bursts setting free the bacilli in the skin. "In order, however, to answer the question whether there exists a primary lepromatous polyneuritic form of leprosy as a separate entity, it would be

necessary to make a detailed study of every case showing early neuritic signs." It is suggested that Korea would be a suitable place for this investigation, as the earliest manifestation of the disease in that country is an area of rather vague anaesthesia and numbness in the extremities without visible cutaneous signs. *Ernest Muir*

SMITH, R. S. & ALEXANDER, Suzanne. **Heinz-Body due to Dapsone.** *Brit. Med. J.* 1959, Mar. 7, 625–7, 2 figs.

"Four cases are described in which blood showed the formation of Heinz bodies following the administration of dapsone.

"Three of these patients, whose blood showed numerous Heinz bodies, developed haemolytic anaemia.

"Examination for Heinz bodies is a simple and useful test in the control of patients receiving dapsone."

SÉRIÉ, C. & SCHALLER, J. K. Essai de traitement de la lèpre par le "para-amino-salicylate d'isonicotyl hydrazide". [**Trial of Leprosy Treatment with "Para-amino-salicylate of Isoniazid"**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 563–70.

13 patients, 8 of them lepromatous and 5 tuberculoid, were treated with this drug, the treatment lasting for 6 to 15 months. In the tuberculoid patients there was definite improvement, but in the lepromatous type it was more doubtful and a longer time would be necessary to assess the therapeutic value. It is suggested that it might be used as a maintenance drug because of its harmlessness, its tolerance and its easy absorption when given orally. The dose given was 6 tablets amounting to a total of 600 mgm. daily for 6 days with one day's rest, lasting for 6 months, then after 3 months' rest a further period of 6 months' treatment. *Ernest Muir*

FLOCH, H. & MAILLOUX, M. Sur l'activité de certains antibiotiques fongiques dans la lèpre. [**On the Action of Certain Fungal Antibiotics on Leprosy**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 570–74.

The authors describe 7 leprosy patients whom they treated with a combined treatment of sulphones and antibiotics. The first was given penicillin, 1 million units a day for 7 days a month. The patient was relieved of her previous reactions and progress towards recovery appeared to be more rapid than on sulphone alone. Another patient was given aureomycin, 8 tablets a day for 7 days a month. The improvement, both clinical and bacteriological, was unusually rapid with this combined treatment. 3 other patients were given, in addition to sulphones, Rovamycin, 6 tablets of 250 mgm. daily for 15 days a month. All of these made particularly rapid recoveries. 2 other patients were given, respectively, courses of erythromycin and Rovamycin, and of Mycostatin, in addition to sulphones. They both made rapid recovery.

It is concluded that while no definite statement can yet be made about the part played by penicillin, aureomycin and Mycostatin, the use of Rovamycin and erythromycin along with sulphones not only gives more rapid clearing up of the lesions than the sulphones when given alone, but improves the general condition of the patient and avoids lepra reaction. *Ernest Muir*

CHAMBON, L., PESTEL, M. & NGUYEN-VAN-AI. Contribution à l'étude de la réaction d'inversion dans la lèpre. [**Study of Reaction of Inversion in Leprosy**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 554–62, 5 figs. on 4 pls. [17 refs.]

The authors treated 20 formerly untreated leprosy patients with D-cycloserine (D-4 amino-3 isoxazonidone). Of these patients 6 had typical lepromatous leprosy, 1 had the prelepromatous form, and 2 had atypical forms. The course of these 9 patients is described in this paper.

3 of them began with a daily dose of 750 mgm. rising to 1 gm., and the violent reaction caused by this was controlled with phenylbutazone. The 6 others began with 250 mgm. gradually rising to 1 gm. in the course of about 3 months, while the excessive reactions produced in them were controlled with a hydrocortisone preparation. During the acute phase of the reactions which lasted about 3 months the Mitsuda reaction was negative. From the sixth to the ninth month 4 Mitsuda reactions became positive and 2 doubtful; but all presented at that time cutaneous lesions clinically and histologically characteristic of tuberculoid leprosy. In 3 of the patients the Mitsuda reaction remained negative.

It is concluded that the reactive condition arose independently of allergy to lepromin, and that it produced an alteration in the cutaneous lesions to the tuberculoid or transitional (borderline) form. The result of the reaction was beneficial. The bacilli became granular from the beginning of treatment and disappeared from the macules and papules in 6 to 9 months, though they remained in the form of granules in certain nodules and infiltrated lesions. The more intense the reaction the more rapidly they disappeared.

Ernest Muir

MANEY, W. A. W., FONG, Han-Wee & LING, Lo-Hong. **Trophic Ulceration of the Foot treated with Intra-Arterial Hydergine.** *Internat. J. Leprosy.* New Orleans. 1958, Apr.–June, v. 26, No. 2, 115–17.

Trophic ulcers of the feet in leprosy are chiefly due to anaesthesia and indirectly to the deformity caused, such as talipes varus, and the pressure of weight bearing. A contributing factor is diminished vascularity.

In the trial treatment with intra-arterial Hydergine there were 24 such patients and 10 controls who did not have injections. Hydergine consists of 3 hydrogenated ergot alkaloids which tend to produce vasodilatation by action through the sympathetic, by action on the vessel walls and by inhibition of the vasomotor centre.

Of 25 foot ulcers 9 showed complete healing, 5 showed diminution in size, and 11 showed no improvement. Healing generally had to be followed by

orthopaedic corrective surgery. Hydergine was injected into the femoral artery below Poupart's ligament, 0·3 mgm. being given twice weekly. DDS was given at the same time, and the patient kept recumbent. Healing in the control cases was at least 3 times longer. *Ernest Muir*

TSUGE, K., TANI, T., TANAKA, S. & NAMBA, M. **Tendon Transfers for Claw Hand.** *Acta Med. Okayama.* 1958, July, v. 12, No. 2, 157–73, 13 figs.

"We have recently operated on 56 cases of claw hand and described the method of tendon transfer in Hansen's disease which occupied the majority of the cases, and several problems have been discussed from our experiences."

CHATTERJEE, S. N. **Customs, Laws, Acts and Rules affecting Leprosy Patients of India.** *Internat. J. Leprosy.* New Orleans. 1958, Apr.–June, v. 26, No. 2, 127–33.

By the Hindu Marriage Act of 1956 a petition may be presented at the District Court asking for separation if the marriage partner has had virulent leprosy for 1 year, or for divorce if there has been virulent leprosy for 3 years. The 1890 Railway Act debars anyone with leprosy (infectious or not) from travelling in the same compartment with other persons. Persons with leprosy are also disqualified from obtaining a licence to drive public vehicles, they are not accepted for insurance or for military service, however slight the form of the disease may be. The author points out that these laws are based on a wrong conception of leprosy and should be altered. "All cases of leprosy should be considered curable unless the contrary is proved after prolonged and careful modern treatment." The same principles for giving certificates of cure should be followed in leprosy as in other infectious diseases.

Ernest Muir

MIQUEL, R. **Leprosy Control in Thailand by the Public Health Route.** *Internat. J. Leprosy.* New Orleans. 1958, Apr.–June, v. 26, No. 2, 97–101.

The World Health Organization in association with UNICEF and the Thai Department of Public Health began in 1955 a plan for the rapid reduction of leprosy in Thailand. The plan was to use indigenous lay personnel specially trained in anti-leprosy work by WHO specialists. These would operate from strategically placed centres, using semi-mobile units specially equipped for the purpose. Choosing the province of Khon Kaen with an area of 250 square kilometres and 650,000 inhabitants, they would visit the villages, riding on cycles or in jeeps, and find out cases of leprosy, examine contacts and arrange for isolation and treatment of patients found. This campaign has so far found 6,750 patients with leprosy in the province of Khon Kaen, of which 31·5% are lepromatous. The prevalence is about 1%. The specialized units will remain for 4 years in each zone, so as to complete the treatment, keep trace of

contacts and register new cases of leprosy. At the end of that time the trained indigenous personnel will be integrated into the general public health services beginning in the rural centres of each province. It is hoped in the course of 10 years to cover all the endemic zones in the country.

Ernest Muir

Bol. Oficina Sanitariá Panamericana. 1958, Dec., v. 45, No. 6, 469–556, 1 fig. Seminario sobre el Control de la Lepra, Belo Horizonte, Minas Gerais, Brasil, 30 junio–7 julio, 1958. **[Conference on the Control of Leprosy at Belo Horizonte, Minas Gerais, Brazil, from the 30th June to the 7th July 1958]**

The Conference met under the joint auspices of the Government of Brazil and the Panamerican Health Office (the Regional Office of WHO). In 1949 the Panamerican Health Organization (OPS) had recommended a study of leprosy with the object of directing a campaign against the disease. In 1951 OPS instituted enquiries in Bolivia, Colombia, Ecuador, Paraguay and Peru; in 1955 in Trinidad and Surinam and in 1956 in French Guiana, British Guiana, Guadaloupe, Martinique, St. Lucia and Granada. Following on the results of these enquiries, and with a view to intensifying field work in leprosy, it was determined to hold this conference. 16 countries were represented by 42 delegates, while representatives of the OPS entered into the discussions and acted as secretaries.

There were 6 papers read and discussed. In the first of these Dr. Lauro de Souza Lima, who had done most of the survey work in the various South American and other countries, gave a digest of his findings. In a table he gives the prevalence of leprosy in 54 American countries, varying from 48 per 1,000 in French Guiana to 0·001 per 1,000 in Canada.

In the second paper J. A. Doull assesses the value of isolation in the control of leprosy. If it is not possible to isolate all open cases of leprosy particular stress should be laid on protection of children from infection and the treatment of patients in their own homes. Investigations should be intensified to find an animal to which leprosy can be transmitted. With the help of this a bactericidal drug might be discovered, and with the help of such a drug leprosy might be much more rapidly controlled.

E. Montestruc read a paper on mass treatment. There should be daily, or at least twice weekly, medication if DDS is given by mouth; but he prefers a weekly or fortnightly intramuscular injection so as to be sure that the patient gets the treatment, since daily administration is rarely practicable in mass treatment.

H. Floch considers that preventoria should be done away with in the "specialized" sense, and in most countries there is now no justification for the isolation sanatorium; but the living conditions of the very poor should be improved. DDS therapy has radically changed the method of approach to the whole problem.

O. Diniz (who was also the president of the conference) spoke on the need to integrate the programme for the control of leprosy into that of the general public health services.

The last paper, from the Ministry of Public Health and Social Welfare, detailed the efforts that have been made in the past 30 months to control

leprosy in Paraguay. In that time 923 new cases have been found, of which 35·5% were lepromatous. During this intensive 30-months' campaign almost as many cases have been discovered as in the previous 7 years. Tuberculoid type was found in 39·5% [a much higher proportion than the 23·0% found in Brazil]. *Ernest Muir*

YAMAMOTO, T., NISHIURA, M., HARADA, N. & IMAEDA, T. **Electron Microscopy of *Mycobacterium leprae murium* in Ultra-Thin Sections of Murine Leprosy Lesions.** *Internat. J. Leprosy.* New Orleans. 1958, Apr.–June, v. 26, No. 2, 111–14, 5 figs. on 3 pls.

"1. Lepromas of murine leprosy were studied in ultra-thin sections with the electron microscope.

"2. The cell wall, cytoplasm and nuclear elements of *M. leprae murium* are described.

"3. Around each bacillus there is a distinct electron-transparent zone which distinguishes them from other cytoplasmic components of the leproma cells.

"4. Foamy structures as are seen in human lepra cells were not observed."

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*TREMATODES *(schistosomes, other flukes);* CESTODES *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* NEMATODES *(Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

STREJAN, G. Stadiul actual al imunobiologiei helmintiazelor. [**The Present Stage in the Immunobiology of Helminthiases**] *Microbiol., Parazitol., Epidemiol.* Bucharest. 1958, Nov.–Dec., v. 3, No. 6, 509–21. [37 refs.]

VERVOORN, J. D. & RATULANGIE, C. J. A. **Some Aspects of Haematobium Schistosomiasis in Ahafo (Ghana) and its Treatment.** *Trop. & Geograph. Med.* Amsterdam. 1958, Sept., v. 10, No. 3, 221–8, 1 map.

Routine examinations were made of the centrifuged sediment from the urines of patients from various parts of Northern Ghana and adjacent areas. The purpose was to determine the incidence of urinary schistosomal infection and the amount of clinical trouble caused by this. Some 830 patients were so examined; 61 were found to be infected. The results are set out in tables, which are related to a map showing the locality from which the patients derived. Only one patient in 4 of those found to be infected with urinary schistosomiasis suffered clinical manifestations ascribable to the infection. The authors think that infected persons living in non-endemic areas should be treated to avoid infection of the area; all patients with heavy infections should

be treated in view of the risks to them of later developments of the disease; lightly infected patients free from symptoms living in endemic areas do not need treatment.

[See also EDINGTON, this *Bulletin*, 1957, v. 54, 1202.] *A. R. D. Adams*

LAHITTE, F. G. & GAMET, A. Infarctus du colon sigmoïde et schistosomiase intestinale. [**Infarction of the Sigmoid Colon and Intestinal Schistosomiasis**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 516–20.

The English summary appended to the paper is as follows:—

"The authors report the observation of an infarctus of the sigmoid colon in a little European child for which all habitual aetiologies ought to be discarded and it was attributed to a massive infestation by *Schistosoma mansoni*. It was a case of a surgical form of intestinal schistosomiasis that, as it seems, has not yet been described. The above case led to the detection of a focus of intestinal bilharziasis well localized in a region of the North Cameroons where it is usual to find particularly cases of bilharziasis due to *Schistosoma haematobium*."

DI EGIDIO, M. Nozioni sulla distribuzione geografica e sull'epidemiologia della bilharziosi intestinale ed urinaria nello Yemen. [**The Epidemiology and Geographical Distribution of Intestinal and Urinary Schistosomiasis in the Yemen**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, Nov., v. 39, No. 11, 685–708, 6 graphs & 3 figs. [22 refs.] English summary.

Both forms of schistosomiasis are present in the Yemen and the vectors are considered to be *Biomphalaria boissyi arabica* for *S. mansoni*, and *Bulinus contortus* [*truncatus*] for *S. haematobium*. The data for this paper were culled from the records of the Ahmed I Royal Hospital at Taiz to which patients come from all parts of the kingdom.

The country is divided into a coastal strip, mid- and high-level plateaux, and the eastern desert, and there are considerable climatic, nosographic, floral, and faunal differences in the four regions. Most of the population live in the mid-plateau region.

The results of examination for schistosomes were as follows:

S. mansoni. In 1955, 1,952 faeces were examined and 24·6% were found positive; in 1957 4,148 were examined, 8·4% of which were positive.

S. haematobium. Here the data are not so complete as many of the people affected live in the northern region and do not come to Taiz. However, in 1955, 1,484 urines were examined, of which 3·1% were positive; in 1957, of 2,795 examined, 1·4% were found to be positive. There does not seem to be any special seasonal incidence for either infection.

As to the geographical distribution, in the years 1955–57 *S. mansoni* patients came from 19 different areas; and urinary schistosomiasis patients from 12 areas with a focus of special intensity round the city of Haggia in the extreme north of the country in the high plateau region.

The persons most affected were those aged 21–30 years, and 11–20 years; males were very much more often affected than females. This is considered to be due to the custom of ritual ablution which females carry out in private.

The author concludes by stating that foci of great intensity exist in the country which must therefore be included among those with a high incidence.

W. K. Dunscombe

MINNING, W., NEWSOME, J. & ROBINSON, D. L. H. Trematoden-Stoffwechselprodukte als Antigene. [**Metabolic Products of Trematodes as Antigens**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 4, 335–42.

Extracts of the body substances of trematodes and of the digestive organs of snails infected with *Schistosoma* have been used successfully as antigens in the complement-fixation reaction. In this article the authors show that the metabolic products of *Schistosoma* and of *Fasciola hepatica* are also antigenic by maintaining the adult worms in a culture medium consisting [in the case of *S. mansoni*] of normal horse serum with the addition of 0·1% glucose. *F. hepatica* were kept in a modified STEPHENSON's medium [*Parasitology*, 1947, v. 38, 116). These media were used as antigens and the results showed that the media in which *Schistosoma mansoni* and *F. hepatica* were kept for varying periods of time had antigenic properties. The antigenic effect was due to the metabolic products because media in which the worms died gave negative results. *S. mansoni* antigen reacted with the serum of monkeys infected with the homologous parasite, but it has yet to be determined if it is species- or genus-specific. *F. hepatica* antigen gave positive reactions with the sera of human beings infected with the homologous parasite, but gave negative results with the sera of those infected with *S. mansoni*.

P. A. Clearkin

HALAWANI, A. & BADRAN, A. **The Value of Rectal Biopsy in the Diagnosis of Urinary Schistosomiasis.** *J. Egyptian Med. Ass.* 1958, v. 41, Nos. 9/10, 439–46. [10 refs.]

Stool examination for *Schistosoma mansoni* eggs is an unsatisfactory method of diagnosis. Mucosal scraping with the gloved finger is little better. Rectal biopsy through a proctoscope is recognized to be superior to either, and is efficient in the diagnosis of urinary *S. haematobium* infections also.

Studies on 106 patients in Egypt confirmed the value of rectal biopsy in the detection of either infection. It was observed that the *S. haematobium* eggs recovered by this technique are almost invariably dead; this is the case whether the infection is an active one, or an old or treated one, which involves the bladder. When living eggs of either parasite are recovered by rectal biopsy it indicates an active intestinal infection with either parasite which demands specific treatment.

A. R. D. Adams

BARUFFA, G. & MAFFI, M. Considerazioni sull'impiego di un derivato del tioxantone (Nilodin) nella cura ambulatoria di massa della bilharziosi (schistosomiasi) vescicale nella popolazione rurale in Somalia. [**The Use of Nilodin in the Mass Treatment of Vesical Schistosomiasis in Somalia**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1958, Nov., v. 39, No. 11, 661–76. [18 refs.] English summary.

The authors refer to the previous work of LIPPARONI [this *Bulletin,* 1954, v. 51, 404] on 40 hospital patients in whom Nilodin in dosages of 75–100 mgm./kgm. body weight were only partly successful. In contrast they have tried ambulant treatment of a rural population in order to cause as little disturbance of the patients' lives as possible and to see whether such treatment could be tolerated and successful.

This arrangement was tried in two areas. In one area 23 male patients, 5 under 15 years old, with vesical schistosomiasis were first examined clinically to exclude liver and renal disease, which are absolute contra-indications. They then received a total dose of 60 mgm./kgm. Nilodin given in 2 doses per day for 3 days, before starting and after finishing work. All were warned as to possible disturbances after the injections, and some patients received anti-histaminics as well. Under these conditions the drug was not well tolerated, especially by the adults. None was cured. In the second area the dosage was increased to 75 mgm./kgm. in 50 adults and 34 children aged 8–15 years. Here most of the adults and half the children showed symptoms of intolerance to the drug, even though in this instance the agricultural work was little or almost non-existent. Cures (after 6 weeks only) were 9·5%.

The authors consider that the symptoms of intolerance, even to doses as small as 60 mgm./kgm., were such as to exclude the use of Nilodin in the ambulatory treatment of vesical schistosomiasis; that the low percentages of cure in children is noteworthy; and that given the definite seasonal nature of the infection little immunity is developed. *W. K. Dunscombe*

FORSYTH, D. M. **Practical Difficulties in the Treatment of Schistosomiasis in an Arab Community. A Review of over 200 Cases treated by Various Methods.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Sept., v. 52, No. 5, 439–45. [11 refs.]

Schistosomiasis is rarely acquired in Kuwait, where it is only lightly endemic. Imported employees of the Kuwait Oil Company are often found to be infected. 217 of these (207 with *Schistosoma haematobium,* 12 with *S. mansoni,* and 2 with both parasites) have been variously treated for their infections as follows:—

14 *S. haematobium* patients and 1 *S. mansoni* patient were treated with sodium or potassium antimony tartrate given on alternate days to a total of 30 grains. 11 did not complete treatment in view of its toxicity; of the remaining 4 all but one were cured (all *S. haematobium*).

Intensive (2-day) treatment by intravenous drip with tartar emetic (total 12 mgm./5 kgm. body weight) of 13 patients gave 2 cures in the 4 patients (all *S. haematobium*) who completed the course and were adequately observed.

Intensive (3 injections in 1 day) treatment with tartar emetic (total 12 mgm./10 kgm. body weight) cured 3 (all *S. haematobium*) of 14 patients (1 *S. mansoni*) adequately observed.

An intensive (5 injections at 12-hour intervals) treatment with tartar emetic (total 60 mgm./54 kgm.) gave 9 cures (8 *S. haematobium* and 1 additionally with *S. mansoni*) and 14 relapses (all *S. haematobium*).

Another intensive (6 injections at 24-hour intervals) treatment with tartar emetic (total 15 mgm./kgm. body weight) gave 1 cure and 2 relapses (all

S. haematobium); another patient collapsed and died on the day of the last injection.

Miracil D (Nilodin) in uncoated tablets was given in full dosage (60 mgm./kgm. body weight daily for 3 days) to 26 patients; 20 of these could not complete the course in view of its toxicity. Only one of the remaining 6 (all *S. haematobium*) was cured. The same drug was given to 16 patients in doses of 10 mgm./kgm. body weight twice daily for 6 days. One was cured and 12 relapsed (all *S. haematobium*); the others defaulted.

Miracil D (500 to 600 mgm./54 kgm. body weight) was given concurrently with the 5-injection tartar emetic treatment to others; of these 2 were cured and 10 relapsed (all *S. haematobium*).

Anthiomaline (40 cc. divided and given on alternate days intramuscularly) cured 13 (12 *S. haematobium* and 1 *S. mansoni*) and failed to cure 11 (9 *S. haematobium* and 2 *S. mansoni*).

Stibophen (50 cc. divided and given on alternate days) cured 3, and 6 relapsed (all *S. haematobium*).

Arsenoxide, a trivalent arsenical (0·06 gm./60 kgm. body weight), given intravenously at 6-hour intervals for 5 days, cured 1 (*S. mansoni*) but not 7 (*S. haematobium*) of those adequately treated and observed.

The criterion of cure in the case of *S. haematobium* infection was the passage of 3 ovum-free specimens of urine at 3 weeks, at 6 weeks and at 3 months after treatment. In that of *S. mansoni* it was the passage of 5 ovum-free stools at the same intervals.

The results of treatment of the schistosomiasis in Kuwait have been very disappointing; apart from the poor cure rates, many of the immigrant Arabs and Iranis appear temperamentally and physically unsuited to sustained treatment and its toxic effects. The default rate was high. Of the treatments mentioned the 5-injection tartar emetic course seems the best for in-patients, and the anthiomaline course for out-patients. *A. R. D. Adams*

Barbosa, F. S., Barbosa, I. & Rodriguez, J. D. ***Tropicorbis philippianus* (Dunker) a Potential Intermediate Host of *Schistosoma mansoni* in Ecuador.** [Research Notes.] *J. Parasitology*. 1958, Dec., v. 44, No. 6, 622.

Senft, A. W. **A Perfusion Apparatus for Maintenance and Observation of Schistosomes** *in vitro*. *J. Parasitology*. 1958, Dec., v. 44, No. 6, 652–8, 4 figs.

"A detailed outline for construction, sterilization, and operation of a 'heart-lung' apparatus for maintenance of schistosomes in vitro is given. By means of this device, schistosomes may be observed continuously for periods of several days to a week in an environment which simulates the portal system. Provision has been made for altering the physical conditions of temperature, pressure, and flow rates. The machine can be set to provide pulsatile or gravity flow at will. Composition of the perfusion fluids may be changed so as to assess the effect on worms under study."

WARREN, K. S. & DEWITT, W. B. **Production of Portal Hypertension and Esophageal Varices in the Mouse.** *Proc. Soc. Exper. Biol. & Med.* 1958, May, v. 98, No. 1, 99–101, 2 figs.

Attempts to produce consistent portal hypertension in experimental animals have been largely unsuccessful. The present authors from the National Institute of Allergy and Infectious Diseases, Bethesda, Maryland, working on the premise that oesophageal varices would not only simulate the consequences of portal hypertension in man but would indicate that sustained rise of pressure which is a major criterion for portal hypertension, report the occurrence of portal hypertension and oesophageal varices in young adult Swiss mice experimentally infected with *Schistosoma mansoni*.

The mice were exposed individually to 100 cercariae of the Puerto Rican strain of *S. mansoni* and this produced an average of 24 worms per mouse in the portal circulatory system. From the 6th to the 16th week after infection the mice were killed at intervals of 14 days. Portal pressure was measured by the introduction of a 22-gauge needle, connected to a strain gauge, into the portal vein. Portal hypertension was considered to be present when the pressure exceeded 10 cm. of water. X-ray pictures were also obtained, with the use of an opaque medium injected into the portal vein. When oesophageal varices occurred they were easily seen, but the authors also preserved them by injection of a yellow latex medium into a mesenteric vein (at 200 mm. Hg pressure).

Oesophageal varices were not seen in control animals or in those which had been infected for less than 10 weeks. They were, however, observed in 43% of mice studied 10 to 16 weeks after infection. They arose from the plexus around the stomach, spleen and liver, joining the systemic circulation usually through the inferior vena cava or pulmonary veins. These findings are illustrated in a photograph of an injected preparation and in an X-ray portogram. The varices were all on the serous surface of the oesophagus and never within its lumen.

The portal pressure in the control animals averaged 5 cm. of water but in the infected mice it rose to an average of 10·3 cm. from the 8th to the 16th week. From the 10th week, the average portal pressure of 23 infected mice without varices was 9 cm. of water and in 13 mice with varices it was 13·3 cm. Portal pressure, on the criterion set out above, occurred in 51% of mice examined from the 10th week of infection onwards.

Evidently, production of *S. mansoni* infection in mice is a fairly rapid method for reproducing portal hypertension in small laboratory animals. The authors plan studies in larger animals, provided that a suitable host can be found.

The methods for producing hypertension in animals previously attempted are discussed: one of these was to reproduce Laennec's cirrhosis and it is pointed out that while portal hypertension has been reported to occur in only 30% of human cases of this condition, it has been estimated to occur in 40–70% of those with hepato-splenic schistosomiasis [this *Bulletin,* 1956, v. 53, 339]. Another method used was to introduce relatively inert substances into the portal circulation to create a mechanical block. Not only do *S. mansoni* eggs in large numbers do this, but they also obliterate the whole portal area by means of a localized fibrosis [*ibid.,* 210]. This factor, the authors point out, may be the final one in determining the development of portal hypertension in mice infected with *S. mansoni*.

[This is an important contribution to what the authors quote as the " enigma of portal hypertension ".] *H. J. O'D. Burke-Gaffney*

BRENER, Z. & PELLEGRINO, J. **Chemotherapy of Experimental Schistosomiasis. I. Drug Activity and Mode of Action of a New Thioxanthone Derivative.** *J. Parasitology.* 1958, Dec., v. 44, No. 6, 659–64, 2 figs. & 1 graph. [14 refs.]

" A new thioxanthone derivative, 1-(diethylaminoethylamino)-4,6,8-trimethyl-5-azo-thioxanthone-hydrochloride, was tested for therapeutic activity in mice experimentally infected with *Schistosoma mansoni*. Significant decrease in the number of granulomas and death of the worms was observed in the treated animals. The study of the mode of action of this thioxanthone showed that an early migration of the worms to the liver occurred after drug administration. This shift was followed by immobilization of the worms by inflammatory reaction which produced disintegration of the schistosomes."

CHU, Chiao-Chen & TING, Kuang-Sheng. [**Studies on Antischistosomal Drugs. XIV. Experimental Therapy with Sb-11 in Monkeys**] Reprinted from *Acta Physiologica Sinica.* 1958, Dec., v. 22, No. 4, 343–8. [11 refs.] [In Chinese.]

The English summary appended to the paper is as follows:—

" (1) In 12 apparently healthy monkeys, the average respiratory rate was 46/minute, heart rate 227/minute, systolic/diastolic pressures 155/123 mm Hg, rectal temperature 39·0°C, erythrocytes 5·3 millions/cu mm, leukocytes 15700/cu mm, among which were lymphocytes 50·8%, neutrophils 45·0%, monocytes 2·0%, eosinophils 1·6%, and basophils 0·6%.

" (2) Sb-11 (H_2O_3Sb- -SCH_2COONa) is a pentavalent antimonial salt of stibonic acid. Intravenous injections at the daily dosage of 10 mg/kg in monkeys for 3 or 6 weeks produced no cough, nausea, vomiting, anorexia or other reactions. Likewise, Sb-11 had no significant influence on the respiration, blood pressure, EKG, temperature, and the blood cell counts.

" (3) Five monkeys were each infected with 300 cercariae of *Schistosoma japonicum*. Beginning on the 43rd day after the infection, Sb-11 was given intravenously in 3 monkeys at the dosage of 10 mg/kg/day for 3 weeks. The remaining 2 monkeys served as control. After a holding period of another 4 weeks, the monkeys were autopsied. The numbers of the helminths remaining in the 3 monkeys of the medicated group were 0, 1 and 13 respectively, with the schistosomes all degenerated, while those of the control group were 81 and 138 respectively. So the therapeutic effect of Sb-11 was very remarkable.

" (4) The toxicity of Sb-11 was rather low. Drug tolerance to Sb-11 developed quickly in monkeys which showed no toxic manifestations after a course as long as 6 weeks. Hence Sb-11 is recommended to be tried clinically on those patients who cannot receive intensive treatment of tartar emetic."

GRODHAUS, G. & KEH, B. **The Marine, Dermatitis-Producing Cercaria of *Austrobilharzia variglandis* in California (Trematoda: Schistosomatidae).** *J. Parasitology.* 1958, Dec., v. 44, No. 6, 633–8. [12 refs.]

Darbon, A., Portal, A., Morilleau, R. & Jame, P. Un cas de distomatose hépatique à *Clonorchis sinensis* traité et guéri par la chloroquine (nivaquine) après échec de l'émétine. [**A Case of *Clonorchis sinensis* Infection treated and cured by Chloroquine (Nivaquine) after Failure of Emetine**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 511–14.

Nakase, M. [**Studies on the Cystic Larvae Parasitic in Crabs in Shikoku District. Report 1.** *Paragonimus westermani*] *Shikoku Acta Med.* 1958, Oct., v. 13, No. 4, 494–506, 2 figs. [63 refs.] [In Japanese.] English summary. [**Report 2.** *Macrorchis spinulosus, Microphalloides japonicus,* **and a Kind of** *Levinseniella*] *Ibid.,* 507–19, 3 figs. [40 refs.] [**Report 3.** *Metacercaria shikokuensis* n. sp.] *Ibid.,* 520–27, 2 figs. [27 refs.]

i. In an examination of 4,284 freshwater crabs in the Shikoku district of Japan, cystic larvae of *Paragonimus westermani* were found in *Eriocheir japonicus* and *Potamon dehaani*. In the latter the percentage of infection was low (1·2%). The infection in *E. japonicus* was lower in Tokushima than in Kochi Prefecture and in the former it varied in the different river districts between 4·1 and 37·5%.

The detailed findings are shown in tables. The largest number of larvae was 57 in a district in Kochi and 51 in a district in Tokushima. No larvae of *P. westermani* were found in *Cambarus clarkii*.

ii. The interest to readers of this *Bulletin* in this paper lies in the difference between the 3 species named and *P. westermani,* and this is set out in tables in English in the Japanese text.

iii. The morphology, susceptibility of animal hosts and distribution of this parasite are discussed.

[See also this *Bulletin,* 1958, v. 55, 1252; 1959, v. 56, 182.]

H. J. O'D. Burke-Gaffney

Chappell, A. C. **Cerebral Cysticercosis complicated by Pyogenic Meningitis.** *Postgraduate Med. J.* 1959, Mar., v. 35, No. 401, 156–9, 1 fig.

Jolly, A. Réaction de Casoni et kyste hydatique. Valeur de la réaction. Étude statistique des concordances et discordances des réponses de la réaction avec l'observation clinique des malades. [**The Value of The Casoni Reaction in relation to Hydatid Cysts. Statistical Study of Agreements and Disagreements with Clinical Findings**] *Maroc Méd.* 1958, July, v. 37, No. 398, 773–8.

221 Casoni reactions were done in 1957 in the laboratory of the Maurice Gaud Hospital, Casablanca, by the same person. The antigen was prepared from human hydatid cysts, and the results were examined 1 hour, 6 hours and 24 hours later. 85 reactions were requested by external practitioners and the clinical data of only 14 were available. Of 144 tests done on hospital patients, 55 were positive and 89 were negative. Of the 55 with positive reactions, 49 had hydatid cysts, and of those 89 with negative reactions 73 had no cysts and in 15 instances clinical data were not available.

The overall number of positive reactions was 37·4%. *W. E. Kershaw*

Mazzotti, L. Resultados negativos de la infección experimental de seis zorras de la especie *Urocyon cinereoargenteus,* con *Echinococcus granulosus.* [**Failure to Infect Six Foxes** (*Urocyon cinereoargenteus*) **with** *Echinococcus granulosus*] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1958, June, v. 18, No. 2, 63–6.

The English summary appended to the paper is as follows:—

"Six foxes of the species *Urocyon cinereoargenteus* were fed with fertile cysts of *Echinococcus granulosus.* Examination of their intestines at autopsy three months later was negative."

Foy, H., Kondi, Athena & Austin, W. H. **Hookworms as a Cause of Tropical Iron Deficiency Anaemia. Radio-Active Studies.** *East African Med. J.* 1958, Nov., v. 35, No. 11, 607–15, 4 figs. [19 refs.]

4 adult Africans with severe hypochromic anaemia were selected, 2 with heavy and 2 with light hookworm infections. Stools were collected daily after suitable radioactive tagging of the circulating erythrocytes, and their specific activity was measured to determine the daily loss of blood over periods of 37 to 48 days. At the same time ferrous sulphate, 1·0 gm. daily, was given by mouth. At the end of this period anthelmintic treatment expelled 1,100 and 1,500 *Necator americanus* from 2 patients, and about 10 from the other 2.

Before worming, the Hb of the first pair had risen from 3·8 to 14·6, and from 2·6 to 14·5 gm./100 ml., respectively; the increases in the second pair were from 4·0 to 12·7 and from 5·8 to 13·0 gm./100 ml. It was calculated that the average daily blood loss in the heavily infected patients was about 12 ml., and in the other 2 patients nil. [Thus it appears that one worm causes the loss of about 0·01 ml. of blood daily, very much less than previous workers had estimated.] Nevertheless, the authors think that the loss caused by 500 to 1,000 worms must often lead to anaemia when the margin of iron intake over iron requirements is narrow, as in many tropical countries.

Alan B. Raper

Tasker, P. W. G. **Studies of the Nutritional Anaemias of Malaya. The Influence of Hookworm Infection.** *Med. J. Malaya.* 1958, Dec., v. 13, No. 2, 159–64, 3 figs. [20 refs.]

The degree of anaemia and the presence or absence of hookworm ova in the stools were correlated in over 1,400 patients in Kuala Lumpur, mostly Chinese and Indians. No worm or egg counts were made. The lower the haemoglobin values, the higher the proportion of hookworm carriers, and also the higher the proportion of patients with occult blood in the stools. Informative graphs are published. Significantly, the rate of roundworm infection was unrelated to the Hb level; so too was the hookworm rate among the megaloblastic anaemias encountered. In the aetiology of the prevalent iron-deficiency anaemia of Malaya [this *Bulletin,* 1956, v. 53, 237], therefore, hookworm infection is accepted as a factor.

The albumin-globulin ratio in the serum protein of 162 severely anaemic patients was used as a measure of malnutrition; on this basis, malnutrition was not found to be correlated with high hookworm rates. *Alan B. Raper*

GOODWIN, L. G., JAYEWARDENE, L. G. & STANDEN, O. D. **Clinical Trials with Bephenium Hydroxynaphthoate against Hookworm in Ceylon.** *Brit. Med. J.* 1958, Dec. 27, 1572–6, 2 figs. [10 refs.]

Members of a series of quaternary ammonium compounds have previously been shown by workers in the Wellcome Laboratories of Tropical Medicine to be active against many nematodes which are parasitic in laboratory and domestic animals. The authors now report clinical trials against *Ancylostoma* infections in man of salts of bephenium (benzyldimethyl-2-phenoxyethyl-ammonium), which were a sequel to a preliminary pilot trial which had shown promising results in London. This large-scale experiment was carried out in Ceylon in two general hospitals, in a children's hospital and on a tea and rubber estate.

The investigation comprised an initial egg count on the faeces by the Stoll technique, followed by a second count 4 days after treatment if eggs were still present in a direct smear of faeces. The results were expressed in terms of the percentage of patients showing specified percentage reductions in egg counts.

Of the salts available, bephenium bromide, the most soluble, which has a very bitter taste, proved unacceptable as well as relatively inefficient, and its use was abandoned. Bephenium embonate, the least soluble, also proved unsatisfactory. Bephenium hydroxynaphthoate emerged as the most effective salt, and its combination with the bromide resulted in no increase in efficiency and retained the disadvantages accruing from the bitterness of the latter.

In recording the results of treatment the dosage of bephenium hydroxy-naphthoate used is given as weight of the base. All patients treated proved to be harbouring *Necator americanus*. Since the pilot trial had shown that, even in children, there was no intolerance to a dose of 2 to 3 gm., while less than 2 gm. did not reduce the egg count, a standard dose of 2 to 3 gm. was adopted, irrespective of age and weight. Preliminary or subsequent purgation tended to decrease the efficiency of the drug, presumably by reducing its period of contact with the worms.

The treatment schedules tested were as follows:— (i) a single dose of 2 to 3 gm., (ii) 3 doses of 2 gm. in 1 day, (iii) daily single doses of 2 gm. for 4 days. In the case of course (i) a comparative trial of bephenium hydroxynaphthoate at a dosage of 2 gm., at a dosage of 2·5–3 gm. and of tetrachlorethylene 1·8–2·4 ml. (adult dose) in a saline purge, was carried out.

The results obtained, which have been abstracted from Table I of the paper, may be tabulated thus:—

Reduction in Egg Count of	Bephenium 2 gm.	Bephenium 2·5–3 gm.	Tetrachlorethylene 1·8–2·4 ml.
100–75%	11 out of 16 (69%) patients	13 out of 29 (45%) patients	8 out of 11 (73%) patients
74–25%	3 out of 16 (19%) patients	11 out of 29 (38%) patients	0 out of 11 patients
24– 0%	2 out of 16 (12%) patients	5 out of 29 (17%) patients	3 out of 11 (27%) patients

The mean initial egg loads were comparable in each group.

Comparing courses (i) and (ii), the results obtained were very similar and the differences too slight to be significant. Course (ii) led to a reduction in

egg count of 100–75% in 21 out of 27 (78%) subjects, of 74–25% in 3 (11%) and of 24–0% in 3 (11%) of the persons treated.

Course (iii) was designed for use in children who were in a critical condition as a result of malnutrition, anaemia and severe gastro-enteritis, and whose precarious state precluded the use of tetrachlorethylene. The drug was well tolerated and the following results were obtained:— 100–75% reduction of egg load in 14 out of 18 (78%) patients, 74–25% reduction in 2 out of 18 (11%) and 24–0% reduction in 2 out of 18 (11%).

To test the efficiency of bephenium hydroxynaphthoate under field conditions, a visit was made to a large tea and rubber estate, whose labour force was heavily parasitized. To groups of labourers and their families, a standard dose of 3 gm. was given alone, or preceded by a purge, or accompanied by a purge, combined with 1 fluid ounce of piperazine citrate syrup or as a daily dose of 1 gm. for 4–5 days. The results showed that preliminary or concurrent purgation was disadvantageous, combination with piperazine did not impair the action of bephenium against ankylostomes, while the sequential daily dose was somewhat more effective than the single large dose.

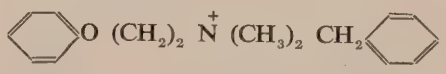
Tetrachlorethylene 1·8 ml. with a saline purge proved as effective as a single 3 gm. dose of bephenium, but was less successful than the repeated daily dose of the latter. It seems therefore that bephenium hydroxynaphthoate in a single dose of 2–3 gm. was as effective as the standard dose of tetrachlorethylene (1·8 ml.) used in Ceylon both in hospital patients and in the field, and did not cause the giddiness and nausea sometimes associated with the use of the latter drug. [The abstracter would observe, however, that doses of tetrachlorethylene of 3–4 ml. are commonly given to adults in India and elsewhere without adverse effects.] Bephenium hydroxynaphthoate is clearly the drug of choice whenever it is necessary to eliminate ankylostomes from marasmic, anaemic children suffering from chronic diarrhoea whose precarious condition does not justify the use of even a small dose of tetrachlorethylene.

Bephenium also proved active against ascariasis, so much so that the addition of piperazine did not, to judge from a limited trial, augment the efficiency of the former: bephenium in a single dose of 3 gm. or in sequential doses of 1 gm. for 4–5 days proved superior to tetrachlorethylene 1·8 ml. given with a saline purge.

[Bephenium hydroxynaphthoate is clearly a most valuable anthelmintic, whose special advantage lies in its non-toxicity, ease of administration and effectiveness against both hookworms and roundworms. It is as good, but probably not better than tetrachlorethylene, for routine use in healthy subjects, and the relative price of either will probably determine which is used in large-scale campaigns.] *J. H. Walters*

ROGERS, E. W. **Excretion of Bephenium Salts in Urine of Human Volunteers.** *Brit. Med. J.* 1958, Dec. 27, 1576–7, 3 figs.

Bephenium



is one of the members of a series of quaternary compounds, active against a number of parasitic nematodes, which caused relatively few toxic side-effects. The urinary excretion of salts of the above compound by human patients is reported in this communication. The method of estimation used was based on the combination of the above substance with methyl orange [*cf.* BRODIE *et al.*, this *Bulletin,* 1947, v. 44, 793]. Each patient was given the drug (bromide, embonate or hydroxynaphthoate) orally in single doses of 1 to 6 gm. daily or in 2·5 gm. doses daily for 3 to 4 days. The cumulative excretion rates were measured and the percentage of administered dose excreted was determined. The excretion rate was low, and over a 24-hour period ranged between 0·79 and 0·04% of the administered dose. Nausea and vomiting occurred in patients receiving the bromide salt, but side-effects were slight in those receiving less soluble salts.

J. D. Fulton

PRIETO LORENZO, A. La lucha contra la anquilostomiasis en Italia. [**Control of Ankylostomiasis in Italy**] *Med. Trop.* Madrid. 1958, Dec., v. 32, No. 6, 438–56, 1 map. [36 refs.]

ROMAN, E. & DOUCHET, C. Migrations dans l'appareil respiratoire du rat du Nématode *Strongyloides ratti*; possibilités de passage dans les poumons de la souris de *Str. stercoralis* de l'homme. [**Migration of** *Strongyloides ratti* **in the Respiratory System of the Rat. Possible Migration of** *Strongyloides stercoralis* **of Man in the Lungs of Mice**] *C.R. Soc. Biol.* 1958, v. 152, No. 11, 1515–17.

ONO, H. [*Ascaris* **Eggs and Shore Fishes and Shellfishes**] *Igaku Kenkyu.* Fukuoka. 1958, Nov., v. 28, No. 11, 4463–70, 1 fig. [In Japanese.] English summary.

The author from Kyushu University, Japan, fed marine fish caught offshore with *Ascaris* eggs in order to study their fate in the intestinal tract of the fish. When mature eggs containing larvae were given they were found to hatch in the intestines of the fish and the larvae appeared in the faeces: some of these were alive and active, while others had been digested and were degenerated. No larvae were found in other organs, from which it is presumed that they do not migrate from the intestinal canal after hatching.

Immature eggs at various stages of development passed through the intestines and were discharged unchanged: when they were excreted they developed normally.

The author also examined the intestinal contents of 105 fishes, including shellfish of 15 varieties displayed in fish shops. *Ascaris* eggs were found in 7. No *Ascaris* eggs were found in 81 oysters or in 100 sea mussels, though *Trichuris* eggs were found in a single oyster.

The author concludes that shore fish might be contaminated by human excreta and that this might occur even in natural conditions.

H. J. O'D. Burke-Gaffney

FERNANDO, P. V. D. **Preliminary Investigation of Carica Papaya Seeds as a Vermifuge.** *Indian J. Child Health.* 1959, Feb., v. 8, No. 2, 96–100.

" A preliminary investigation on the use of carica papaya seeds as a vermifuge was done. Its efficacy was compared with that of piperazine citrate. The results showed that papaya seeds as a vermifuge were an almost total failure."

DICKSON, W. & WOODCOCK, R. C. **Visceral Larva Migrans.** *Arch. Dis. in Childhood.* 1959, Feb., v. 34, No. 173, 63–7, 4 figs. [12 refs.]

" A case of visceral larva migrans is described.

" The literature is reviewed and the important signs and symptoms are discussed.

" The disease may be an important cause of chronic eosinophilia in childhood and may account for many of the cases considered to be Loeffler's syndrome or tropical eosinophilia.

" The disease may be more common in this country than is realized because of the high incidence of toxocara infection in cats and dogs. It is suggested that other parasites of domestic pets, such as hookworms, may produce this condition."

JORDAN, P. **A Pilot Scheme to eradicate Bancroftian Filariasis with Diethylcarbamazine. Results of the First Year's Treatment.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Jan., v. 53, No. 1, 54–60. [14 refs.]

Bancroftian filariasis is prevalent in parts of East Africa, with hydrocele as a common complication. A pilot scheme was planned, with the object of reducing the microfilarial count of persons in an endemic area to zero by periodic administration of diethylcarbamazine, thus interrupting transmission. For economic reasons, lower dosage schedules were adopted than those used with encouraging results by KESSEL [this *Bulletin,* 1958, v. 55, 194].

Ukara Island in Lake Victoria, part of which is the site of the experiment, is 6 miles square and has a population of 20,000. Its communications consist only of footpaths. It is very heavily infested with *Anopheles gambiae.* [Presumably also with *Culex fatigans.*] In the localities chosen for the work every house was visited and numbered, and its inhabitants registered by age and sex. Then a night blood survey was made, unmeasured thick blood drops being collected between 8 p.m. and 2 a.m. Co-operation by the people has been purely passive, but the whole population of the experimental area is being treated, and the following different dosage schedules are being tried:

(i) 200 mgm. every month for 6 months; those people in whose night blood microfilariae were found before treatment was started (" positive subjects ") receiving treatment for a further 12 months;

(ii) 200 mgm. every month for 12 months; positive subjects for a further 12 months;

(iii) 200 mgm. every second month for a year; positive subjects for a further year.

(iv) 100 mgm. every month for 12 months; positive subjects for a further 12 months.

Two control areas are being left untreated after survey.

Full assessment of results cannot be made for some years, but the effect of a year's treatment of positive subjects is reviewed. Infections have been divided into two groups, *i.e.*, those with more and less than 50 microfilariae in the original thick blood film. On resurvey after a year's treatment, the lowest percentages of positive bloods in each group were found after schedules (i) and (ii), results from schedules (iii) and (iv) being comparatively poor. In every area at the end of the year's treatment there was a lower percentage of positive bloods in the 1–50 than in the 50 plus microfilarial group. However, greater percentage reductions in microfilariae were found in the 50 plus group.

Possibly, although the great majority of microfilariae are killed by periodic administration of diethylcarbamazine, there remains a " hard core " of resistant larvae. These are important, since *C. fatigans* can become infective after feeding on a person with only 1 microfilaria per 40 cmm. of blood, and preliminary experiments suggest a similar result with *A. gambiae*. It seems that an effective treatment regime for any area will probably depend on the local mean microfilarial density; much higher doses than those so far given may be needed in a heavily infected area. *B. B. Waddy*

Van Den Dorpe, A. L'onchocercose oculaire dans la province du Kasai. [**Ocular Onchocerciasis in the Kasai Province, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1958, Aug. 31, v. 38, No. 4, 737–68, 1 fig. & 5 maps. [17 refs.]

The author used the slit lamp systematically for investigating the epidemiology of onchocerciasis in Kasai province, Belgian Congo, and it proved valuable in the diagnosis and rapid detection of the disease in the villages. Onchocerciasis is a real scourge in the province; it is present everywhere to some extent but is extremely frequent in the region extending from the environs of Mwene-Ditu towards the north to the environs of Pania-Mutombo and Lusambo.

The author analyses the ocular complications of onchocerciasis but does not commit himself over the incidence of blindness in the various villages he visited, or on the amount of such blindness attributable to onchocersiasis.

The results are shown in great detail in tables for the several villages visited, and some of the regions are shown in maps. *D. P. Choyce*

Babero, B. B. & Shepperson, Jacqueline R. **On the Occurrence of Gnathostomes in Georgia, U.S.A.** *Proc. Helminthological Soc. of Washington.* 1959, Jan., v. 26, No. 1, 53–4, 2 figs. [11 refs.]

14 male and female specimens of adult gnathostomes, fitting the description of *Gnathostoma spinigerum,* were recovered from stomach tumours of a raccoon in Georgia. They were surrounded by 4 gastric ulcers which extended to depths within the musculature and from which an extensive gastritis ensued.

More than 100 gnathostome cysts were also collected from the peritoneum of a cottonmouth water moccasin snake (*Agkistrodon piscivorus*). The cysts were barely visible to the naked eye, and they did not result in infection when given orally to a kitten and 3 small white rats.

It appears that 2 intermediate hosts are necessary in the life-history of *G. spinigerum,* a microcrustacean and a freshwater fish, frog or snake [see, for example, this *Bulletin,* 1938, v. 35, 773]. The present findings give additional evidence that certain North American snakes may be intermediate hosts for this parasite. *H. J. O'D. Burke-Gaffney*

PAINE, D. H. D., LOWER, E. S. & COOPER, T. V. **Treatment of Trichuriasis with Dithiazanine. A Preliminary Report.** *Brit. Med. J.* 1959, Jan. 10, 93–5, 1 fig. [11 refs.]

It has been estimated that 355 million persons of the world's population carry the whipworm (*Trichuris trichiura*), of whom some 34 million live in Europe. Though the worms usually inhabit the caecum, in whose mucosal walls their slender necks are embedded, in heavy infections they have been noted in the terminal ileum, the colon and the rectum.

Despite the prevalence of this parasite, no effective treatment has until recently been evolved. Oil of chenopodium, carbon tetrachloride, fig-tree gum, emetine hydrochloride and hexylresorcinol enemata have all proved ineffective, while the value of piperazine salts which some workers have reported is denied by others. However, the introduction of dithiazanine by SWARTZWELDER *et al.* [this *Bulletin,* 1958, v. 55, 530] appears to have reversed the situation. Dithiazanine is a dye of the cyanine series, having this formula—3,3′-diethylthiadicarbocyanine iodide—the basis of whose anthelmintic action lies in its ability to interfere with enzyme systems facilitating carbohydrate metabolism and oxygen uptake, which are specific to certain parasitic helminths and are not shared by the mammalian host. The drug is non-toxic and does not appear to be absorbed from the alimentary tract; its prolonged administration for 3 weeks has been shown in a large series of cases to exert no harmful effect on liver, kidney or bone marrow. It has been employed with safety in pregnancy, and in anaemia, malnutrition, renal and cardiac disease. The faeces are stained a deep greenish blue by the dye. The dosage for adults is 600 mgm. a day, regardless of body weight, and is administered in 3 divided doses each of two 100 mgm. tablets which are enteric and sugar coated. For trichuriasis a 5-day course is recommended.

The authors report the results of such a course of treatment in 6 patients in a mental hospital, in whom the condition had been recognized by the finding of a heavy egg load in the faeces of a patient who was suffering from anorexia, loss of weight and periodic diarrhoea. The investigation comprised estimation of egg load by the Stoll technique on 3 successive daily specimens before treatment and again for 3 days immediately after treatment. One month later the faeces were again examined by the De Riva concentration method.

The results were extremely good. No patient passed ova during the 3 days after treatment, while a number of adult worms, dead and stained blue, were recovered from the faeces of each patient. One patient passed a large number of threadworms on the fourth day of treatment, in addition. After 1 month scanty *Trichuris* ova were discovered in the stools of one patient only, and this man had chewed his tablets and vomited after each dose, thereby losing some of the drug. Side-effects were very mild: one other patient vomited on the first 2 days, 3 patients showed transient elevation of pulse rate and temperature and one patient was thought to look pale on the fifth day.

A more extensive trial is planned as further supplies of dithiazanine (trade name Telmid) become available. *J. H. Walters*

Mazzotti, L., Gonzalez Barranco, Dolores & Arredondo, Antonia. Alteraciones morfológicas en los huevos de *Trichuris trichiura* de pacientes tratados con "Dithiazanine" (yoduro de 3-3′-dietiltiadicarbocianina). [**Morphological Changes in the Eggs of** *Trichuris trichiura* **in Patients treated with Dithiazanine (3,3′-Diethylthiadicarbocyanine Iodide**] *Medicina.* Mexico. 1958, July 25, v. 38, No. 800, 332–5, 8 figs. English summary (4 lines).

The authors refer briefly to the work on the anthelmintic effects of cyanine dyes by Welch *et al.* [this *Bulletin,* 1947, v. 44, 1015], Peters *et al.* [*ibid.,* 1949, v. 46, 763], Pérez-Santiago *et al.* [*ibid.,* 1953, v. 50, 1066], Frye *et al.* [*ibid.,* 1958, v. 55, 436], McCowen *et al.* [*ibid.,* 436], and Swartzwelder *et al.* [*ibid.,* 1958, v. 55, 530].

In this paper the authors briefly describe and give photographs of eggs of *Trichuris trichiura* passed by patients treated with dithiazanine [dosage not given] which show structural alterations, such as bulging at one side and other irregular shapes, corrugated shell or abnormal poles. They suggest that these abnormalities are related to modifications of metabolism such as those noted by Bueding and Swartzwelder (*Pharmacol. Rev.,* 1957, v. 9, 329) in *Trichuris vulpis* in dogs treated with dithiazanine. The authors also dissected eggs out of the uteri of female *Trichuris,* passed by treated patients and found similar changes in these, including one egg with 3 poles. Of 48 female *Trichuris* found in the faeces of treated patients only 17 worms contained a proportion considered to be below normal of eggs typical in appearance. In 5 of these 17 worms only about 5% of the eggs were normally developed, the others being in various stages of development; in 4 of the 17 worms 25% of eggs were normally developed and in 8 about 50%. In the remaining 31 of the 48 worms examined all the eggs were in various stages of development with isolated deformed eggs. The authors suggest that dithiazanine causes the worms to expel the eggs already formed and in the uterus, and that the worm is then incapable of normal ovulation and lays either deformed eggs or eggs only partly developed. *G. Lapage*

DEFICIENCY DISEASES

Wishahy, A. G. **El Labat, an Egyptian Vegetable Milk. Review of the Literature on Vegetable Milks.** *J. Egyptian Med. Ass.* 1958, v. 41, Nos. 9/10, 433–8, 1 fig. on pl.

"El Labat" is a milk substitute made of roasted chickpea, creg of sesame, powdered rice and cane sugar. It can be made in the home from materials readily available in Egypt. Feeding experiments on babies in hospital have

shown that this vegetable milk is an effective substitute for animal milk when the latter is not available. The chemical composition of "El Labat" is similar to that of human milk, but the protein content is higher. [Unfortunately details are not given of the trials nor is it stated at what age infants can tolerate the mixture.] *R. Passmore*

DEODHAR, A. D. & RAMAKRISHNAN, C. V. **Effect of Socioeconomic Status on the Vitamin Content of Milk.** *J. Pediatrics.* St. Louis. 1959, Jan., v. 54, No. 1, 34–5.

The authors, from Baroda, India, examined milk from 175 lactating women in 4 socio-economic groups for the content of vitamin B1, vitamin B12 and pantothenic acid. The results are shown in a table. Pantothenic acid increased from an average of 130·2 μgm./ml. in the very poor to 159·4 μgm./100 ml. in the upper middle class, and this increase is highly significant. Vitamin B12 increased from 0·0792 μgm./litre to 0·1142 μgm./litre, while vitamin B1 decreased from 12·94 μgm./100 ml. in the very poor group to 9·87 μgm./100 ml. in the upper middle class group. The superiority of the vitamin B1 level in the poorest group is statistically significant. *H. J. O'D. Burke-Gaffney*

HORN, H. Beobachtungen über Ernährungsprobleme in den Trockengebieten des Sudan. [**Nutritional Problems in the Dry Areas of the Sudan**] *Ztschr. f.d.g. Hyg. u. ihre Grenzgebiete.* Berlin. 1958, Sept.–Oct.–Nov.–Dec., v. 4, Nos. 5/6, 300–319, 9 figs. [25 refs.]

This paper contains considerable information about the country of the Meganin in the north of the province of Kordofan in the Sudan. The author spent 6 months in the area where he made his own observations but was also helped by the members of an expedition which included geologists, geophysicists, engineers and water supply experts.

There is a description of the geography of the area and its meteorological conditions with some account of the Meganin and their wanderings. Most of the paper deals with the nutritional problems of the people at different times. Particulars of the available foodstuffs are given by reference to published tables (B. S. PLATT [this *Bulletin,* 1946, v. 43, 362], with additions by H. SCHALL and others). The diseases which result from imperfect nutrition and inadequate water supplies are discussed. Scurvy, pellagra and kwashiorkor are widespread diseases. Infant mortality is high and has been estimated to be 60%. Natural resistance to infections is low although adults have acquired a good basic immunity so that numerous infections take a subacute or chronic course. The clinical picture of infectious diseases in general is obscured not only by latent avitaminosis but also by the frequency of chronic malaria and endemic tertiary syphilis. Women suffer much more than men from nutritional disorders largely because of their harder work and the particular conditions to which they are exposed.

There is a discussion of the action which should be taken to improve the lot of this people, so many of whom are apathetic and lacking energy because of bad nutrition. *M. E. Delafield*

Ferro-Luzzi, A. Studio sulle abitudini e sui consumi alimentari di una comunità suburbana della Tripolitania. [**Food Habits and Diets of a Suburban Community in Tripolitania**] Reprinted from *Rass. Italiana Gastro-Enterologia.* 1958, Nov., No. 11, 20 pp. [12 refs.]

The English summary appended to the paper is as follows:—

"The regional food availability of Tripolitania meets only marginally the average calorie and protein requirements of the Arab population: it is deficient in Vit. A and C and in Calcium.

"The community examined by the author follows a vegetarian, monotonous, diet whose staple-food is represented by cereals: the consumption of fresh fruits, vegetables and animal products is very limited.

"Its average calorie value is around 1900 cal.; the protein one is 50–57 g.

"Most of the diets are below the estimated requirements for vit. A, B_2, C and probably also for Ca.

"Infant diets are characterized by a constant supplementation (with mixtures of olive oil, nuts, flours, etc.) of the breast feeding, since the first days of life. Weaning is usually late; the child is abruptly transferred to the traditional vegetarian diet of the adults.

"Preschool-age and school-age children follow diets which are usually deficient in calories and proteins."

Westall, R. G., Roitman, Ellen, De La Peña, Carmen, Rasmussen, H., Cravioto, J., Gómez, F. & Holt, L. E., Jr. **The Plasma Amino Acids in Malnutrition: Preliminary Observations.** *Arch. Dis. in Childhood.* 1958, Dec., v. 33, No. 172, 499–504. [12 refs.]

The concentrations of amino acids in the blood of 4 seriously undernourished Mexican children were determined on admission to hospital and on three subsequent occasions during recovery. 3 of the children showed no specific evidence of protein deficiency, but one was obviously suffering from kwashiorkor. The levels of amino acids in the blood on admission were undoubtedly much below normal. Arginine, ornithine and threonine were markedly reduced and, to a lesser extent, leucine, valine, lysine and tyrosine. The cystine level was very low in the child with kwashiorkor. These levels rose as the general nutrition of the patients improved. Levels of urea were also low and in some patients fell further as improvement took place. It is suggested that some of these changes may be due to deficiency of the enzymes necessary for the formation of amino acids. *R. Passmore*

Jelliffe, D. B. **Protein-Calorie Malnutrition in Tropical Preschool Children. (A Review of Recent Knowledge.)** *J. Pediatrics.* St. Louis. 1959, Feb., v. 54, No. 2, 227–56, 7 figs. [168 refs.]

Charmot, G. & Reynaud, R. L'acétazolamide dans le traitement des oedèmes carentiels de l'enfant. [**Acetazolamide in the Treatment of Deficiency Oedemas in Children**] *Bull. Soc. Path. Exot.* 1958, May–June, v. 51, No. 3, 350–53.

In 6 children aged 18 months to 6 years (2 with kwashiorkor and 4 with severe anaemia due to ankylostomiasis and all with marked oedema)

acetazolamide (Diamox) caused a large diuresis which was associated with rapid clinical improvement in 5 of the patients. *R. Passmore*

KSHIRSAGAR, S. G. & PATWARDHAN, V. N. **The Superimposition of Calorie Restriction on Protein Deficiency—Effects on Liver, Small Intestine and Pancreas of Young Albino Rats.** *Indian J. Med. Res.* 1959, Jan., v. 47, No. 1, 64–72, 1 graph. [25 refs.]

ŠALAMON, T. & RADOVANOVIC, M. **A Contribution to Investigations of Pellagra and its Aetiology in the Province of Bosanska Krajina.** *Acta Med. Iugoslavica.* 1958, v. 12, No. 3, 305–19.

The mean level of nicotinic acid in the blood of 24 pellagrous patients was 0·55 mgm./100 ml. The mean figure for members of their families without symptoms of pellagra was 0·63 and for other patients 0·62. There was a considerable overlap of the figures for the different groups.

A diet survey of 19 families of pellagrins by questionary indicated that the mean daily consumption of nutrients per nutrition unit was as follows: calories 3,194, protein 86 gm. (13 gm. of animal origin), thiamine 3·2 mgm., riboflavin 1·2 mgm., niacin 22·5 mgm., iron 19 mgm., calcium 301 mgm.

It is suggested that in the pathogenesis of the manifest symptoms of pellagra a decisive role is played by the capability of the cells to use up the nicotinic acid from the blood—not its absolute value in the blood. The authors cannot state with certainty that this disturbance in the essential role of nicotinic acid is due to the presence of " pellagragenic " agents in maize, but this is not unlikely. *R. Passmore*

HAEMATOLOGY

NEHAUL, B. B. G. **Serum Protein Levels in a Group of East Indians in a Hospital.** *West Indian Med. J.* 1958, Sept., v. 7, No. 3, 228–31.

" The paper is based on the results obtained in the examination of blood from a group of ' East Indian patients at the Georgetown Hospital '. The object of this study is to ascertain the serum protein level as well as that of albumin and globulin and to determine whether the group as a whole showed any characteristic features.

" This study indicates that the mean total protein of 6·6 g per 100 ml is lower than the generally accepted normal for Europeans, and that the albumin level of 3·2 g per 100 ml is also lower. The level of globulin is higher than the European normal. The interpretation of the findings is difficult without further work.

" This study shows the need for the investigations of samples from the general population in order to obtain ' normal ' figures for the various races living in the Caribbean area."

THERON, J. J., MEYER, B. J. & CONRADIE, F. M. **Serum-Copper Levels of the South African Bantu.** *South African J. Lab. & Clin. Med.* 1958, Dec., v. 4, No. 4, 294–8. [33 refs.]

" 1. Serum-copper determinations were carried out on groups of male and female Bantu and Europeans of comparable ages. Children and pregnant females were included in the study. In all, 157 subjects were investigated.

" 2. The average serum-copper concentration was higher in the Bantu than in the European and statistically significant differences were found between the following groups:

" (*a*) Adult Bantu males and adult European males.

" (*b*) Adult Bantu females and adult European females.

" (*c*) Pregnant Bantu females and non-pregnant Bantu females.

" 3. The average serum copper level of the 18 Bantu children studied was higher than the average value for Bantu adults.

" 4. The possible significance of the above findings is discussed."

LANZKOWSKY, P. & MCKENZIE, D. **Iron Deficiency Anaemia in Cape Coloured and African Children in Cape Town.** *South African Med. J.* 1959, Jan. 10, v. 33, No. 2, 21–4, 6 figs. [16 refs.]

It had been found that many Cape Coloured and African children showed iron deficiency anaemia, but often had no clinical evidence of this. Apparently healthy children aged 1 to 7 years attending crèches in Cape Town were therefore investigated. With a Hb level of ½ gm.% less than Wintrobe's minimum standard for each age as a criterion, 170 out of 262 Cape Coloured, and 46 out of 69 African, children were deemed to be anaemic. 4 groups of children received iron therapy: (i) 0·28 gm. of ferrous gluconate for 24 days, (ii) 2 ml. of colloidal iron for 18 days, (iii) 1·35 gm. of iron ammonium citrate for 24 days, and (iv) 16 ml. of " Parrish's food "—twice the maximum dose—for 24 days. The first 3 preparations produced a significant rise in Hb; the last was ineffective, perhaps because of its content of phosphates.

Alan B. Raper

See also p. 638, FOY *et al.*, **Hookworms as a Cause of Tropical Iron Deficiency Anaemia. Radio-Active Studies.**

See also p. 638, TASKER, **Studies of the Nutritional Anaemias of Malaya. The Influence of Hookworm Infection.**

WELLS, R. **Anaemia in Singapore—an Analysis of 1,046 Cases.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Sept., v. 52, No. 5, 431–8, 2 figs. [19 refs.]

This is a preliminary description of the material seen during 2½ years in an anaemia clinic in Singapore, drawing its patients from maternity, child welfare, and school clinics as well as from hospitals. A fuller report is projected. Initial diagnoses were made on clinical grounds, Hb estimation, and the

examination of a thin blood film. The response to a specific haematinic (iron, vitamin B12 or folic acid) was next assessed, and if it proved unsatisfactory a second haematinic was substituted, and so on. In this way 786 patients were studied. Among these subjects, anaemias responding to iron alone were by far the commonest (601); this was due to low dietary intake, associated in 327 patients with hookworm infection. Vitamin B12 deficiency was considered to be present in 88 patients. Anaemias due to haemorrhage numbered 31, and leukaemias 30. *Alan B. Raper*

Gon, F. **A Bantu Case of Haemolytic Anaemia resembling Acholuric Jaundice.** *South African Med. J.* 1959, Jan. 31, v. 33, No. 5, 87–8.

Lehmann, H. **Variations in Human Haemoglobin Synthesis and Factors governing their Inheritance.** *Brit. Med. Bull.* 1959, Jan., v. 15, No. 1, 40–46, 3 text figs. & 2 figs. on pl. [Numerous refs.]

This is a concise, authoritative, and lively account of the present state of knowledge of the human haemoglobin variants. Being a summary, it cannot be further condensed and should be read in full, both as an introduction to the problems that await solution by workers in the tropics, and as a guide to the larger texts on the subject. *Alan B. Raper*

Neel, J. V., Hiernaux, J., Linhard, J., Robinson, A., Zuelzer, W. W. & Livingstone, F. B. Considerations générales sur la répartition de l'hémoglobine en Afrique-Noire. [**General Considerations on the Distribution of Haemoglobin in Africa**] *Méd. Afrique Noire.* Dakar. 1958, Nov. 16–30, v. 5, No. 22, 507–8.

This article summarizes the results of three haemoglobin surveys carried out respectively in the Eastern Congo and Ruanda-Urundi, in Liberia and French West Africa. In the first survey, labourers on plantations were examined. In the second, personnel of the plantations of the Firestone firm were investigated, and in the last samples came from blood donors provided by the Central Transfusion Service. The subjects were all healthy and adult.

The most significant findings were the absence of haemoglobin C among 935 people from Ruanda-Urundi, 16 people carrying haemoglobin C among 960 subjects from French West Africa, and 7 among 904 from Liberia.

No fast-moving haemoglobins were seen in Ruanda-Urundi and French West Africa but 9 were discovered in Liberia. *H. Lehmann*

Vella, F. & Field, T. E. **Abnormal Haemoglobins in Malay and Nepalese Gurkha Soldiers.** *Med. J. Malaya.* 1958, Dec., v. 13, No. 2, 153–8. [29 refs.]

The authors surveyed the haemoglobin types of 976 Malay and 560 Gurkha soldiers by paper electrophoresis. In the Malays they found 4·82% to show Hb A and E, 0·2% A and D, 1 example of Hb E alone, and 1 subject with

Hb A and K (or J). The only abnormal findings in the Gurkhas were 0·53% showing Hb A and E, establishing for the first time the presence of the E gene in Nepal. Besides this survey, they investigated 2 Malayan patients with a diagnosis of thalassaemia; one was uncomplicated, and one showed Hb E in addition. One "thalassaemia" patient from Nepal proved to have Hb H in addition. There were no family studies. *Alan B. Raper*

Pollitzer, W. S., Chernoff, A. I., Horton, L. L. & Froehlich, M. **Hemoglobin Patterns in American Indians.** *Science*. 1959, Jan. 23, v. 129, 216.

"Two populations of North Carolina have been analyzed for hemoglobin patterns by paper electrophoresis. Of 534 Cherokee Indians, both mixed and full bloods, all showed normal hemoglobin. Lumbee Indians of less certain ethnic status had 1·7 percent of hemoglobin S, an equal amount of hemoglobin C, and one possible hemoglobin D trait among 1332 bloods studied."

[See this *Bulletin*, 1957, v. 54, 1231; 1958, v. 55, 805.]

Smith, E. W. & Conley, C. L. **Sickle Cell-Hemoglobin D Disease.** *Ann. Intern. Med.* 1959, Jan., v. 50, No. 1, 94–105, 5 figs. [20 refs.]

A young white man in South Carolina, diagnosed in infancy as having sickle-cell anaemia, was later shown to have S/D disease. The main features were recurrent pain and swelling of the hands and feet, abdominal pain, pallor and jaundice in infancy, limb and back pain in childhood, and attacks of cough, dyspnoea, and cyanosis with radiological evidence of focal pulmonary consolidation in adolescence. The mother and 5 of her relatives possessed the D trait, and the father and 6 of his relatives the S trait. There was no Negro ancestry; the paternal grandfather, who came from England, had transmitted the S gene to the offspring of each of his 2 wives. It is remarkable that of the 5 families with S/D disease now recorded, 5 of the 10 parents were English, 2 contributing the S gene and 3 the D gene. S/D disease in Negroes may be commoner than is thought, escaping detection because it is assumed to be sickle-cell anaemia. *Alan B. Raper*

Bannerman, R. M., Grinstein, M. & Moore, C. V. **Haemoglobin Synthesis in Thalassaemia; *In-Vitro* Studies.** *Brit. J. Haematol.* Oxford. 1959, Jan., v. 5, No. 1, 102–20, 2 figs. [Numerous refs.]

"Haemoglobin synthesis in thalassaemia major was studied *in vitro* in samples of peripheral blood containing immature red cells. Haem synthesis was estimated by measuring the amount of glycine-2-^{14}C or ^{59}Fe incorporated into it in a given time under standard conditions, and related to the absolute number of immature cells present. In this way it was possible to compare the biosynthetic activity of blood from patients with thalassaemia major with that of blood from patients with other diseases associated with a reticulocytosis.

"An interesting discrepancy was found between the estimate of haem synthesis based on glycine-2-^{14}C incorporation and that based on ^{59}Fe incorporation. The discrepancy is probably due to dilution of the tagged

iron with intracellular non-haemoglobin iron, and was greatest in patients with large iron stores. The ^{59}Fe value may be only one-sixth of the glycine-2-^{14}C value, and the latter is probably the more correct estimate.

"Wide variation in biosynthetic activity was found among the samples investigated. Whole blood was more effective than washed cells, and washed cells twice as effective as haemolysates.

"The activity of thalassaemic samples was consistently low when related to the absolute number of immature cells, many of which were normoblasts. Their activity was not increased by the addition of normal or other plasma. Globin synthesis was demonstrated in thalassaemic and other samples, and no consistent differences in the haem : globin ratio were found in different samples. Thalassaemic samples showed brisk incorporation of ^{14}C-tagged free protoporphyrin into haem, and the uptake of ^{59}Fe into haem in a thalassaemic sample was greatly increased by the addition of free protoporphyrin.

"These results suggest that there is a quantitative impairment of haemoglobin synthesis by immature red cells in thalassaemia, which is an inherent defect of the individual cell. There was no evidence of a specific alteration of globin synthesis. It is suggested, however, that haem synthesis may be impaired in two ways: (i) by a relatively slow rate of protoporphyrin synthesis; (ii) by a partial block in the combination of protoporphyrin and iron."

ERLANDSON, M. E., SCHULMAN, I., STERN, Gertrude & SMITH, C. H. **Studies of Congenital Hemolytic Syndromes. I. Rates of Destruction and Production of Erythrocytes in Thalassemia.** *Pediatrics*. Springfield, Ill. 1958, Nov., v. 22, No. 5, 910–22, 1 fig. [41 refs.]

The article refers to the definition of haemolytic disease and haemolytic anaemia (CROSBY and AKEROYD, *Amer. J. Med.*, 1952, v. 13, 273).

Haemolytic disease exists when the average survival time of red cells in the circulation is less than normal. If any increase in the rate of destruction of red cells is accompanied by a comparable increase in the rate of production of red cells, there may be no anaemia though haemolytic disease still exists. If the rate of destruction of the erythrocytes exceeds the rate of production, anaemia will result. This anaemia need not, however, be progressive—if the volume of erythrocytes produced equals the volume of erythrocytes destroyed, an equilibrium might be reached. When the rate of destruction of the erythrocytes exceeds the rate of production, the volume of erythrocytes is lowered. In the presence of a smaller volume of the red cells, less red cells are being destroyed per unit of time. When the volume of red cells has been lowered to the level at which the number of erythrocytes being destroyed is equalled by the number being produced, a new equilibrium is established, resulting in a stable but low concentration of haemoglobin. The particular concentration of haemoglobin obtained is, therefore, determined both by the haemolytic defect and by the particular capacity of the bone marrow to respond with an increase in production of red cells.

If the volume of erythrocytes of a patient is constant and known, and the mean life span of erythrocytes is determined, the number of erythrocytes and, therefrom, the amount of haemoglobin being destroyed per day, can be calculated.

10 patients with thalassaemia were selected for study, and the survival time of the erythrocytes was determined by measuring the survival of red cells labelled with radioactive chromium. The patients' ages ranged from 10 months to 19 years. Most of them had severe thalassaemia major, but 3 of them showed what is now called the intermediate form of thalassaemia major, *i.e.*, they demonstrated all the criteria of the homozygous disease but maintained concentrations of haemoglobin of 7·4 to 9·9 gm.%. Values for chromium $T\frac{1}{2}$ ranged from 6·5 to 19·5 days; values for mean cell life ranged from 10·3 to 39 days. The rates of destruction of erythrocytes were, therefore, 3·1 to 11·5 times the normal rate.

There was no correlation between the rate of destruction of the red cells and the percentage of foetal haemoglobin. Even more striking was the degree of anaemia demonstrated by the patients which could not be correlated with the rate of destruction, *e.g.*, in 2 cases there were almost identical values for the destruction of the erythrocytes (5·3 and 5·2 times normal), whereas the values for the volume of erythrocytes were 12·5 ml. per kgm. in the former and 22·8 ml. per kgm. in the latter. Rates of destruction of erythrocytes in patients with the intermediate form of disease were 3·1 to 5·2 times normal. The rate of production of erythrocytes varied from 2·2 to 6·1 times the normal rate. However, the rate of production of haemoglobin was less and only ranged from 1·5 to 5·4 times normal. Again, no correlation could be demonstrated between the degree of anaemia in the patients and the rate of production of blood observed, and thus between rate of production of blood and clinical sub-division of the homozygous disease into intermediate and severe form. There was no correlation between the degree of anaemia present or the rate of production of blood and the type of haemoglobin (adult or foetal) produced.

Results in 2 splenectomized patients did not differ significantly from results in the other 8 non-splenectomized patients.

The final status of each patient is determined by the particular balance obtained between rates of production and destruction. Neither production nor destruction alone determines the degree of the anaemia in thalassaemia.

H. Lehmann

VENOMS AND ANTIVENENES

Boquet, P., Izard, Y. & Detrait, J. Recherches sur le facteur de diffusion des venins de serpents. [**Studies on the Diffusion Factor of Snake Venoms**] *C.R. Soc. Biol.* 1958, v. 152, No. 10, 1363–5. [10 refs.]

The following is a translation of the authors' summary:—

All the venoms of Viperidae and Elapidae examined contain a hyaluronidase. The depolymerizing activity of the venom richest in the enzyme (*Dendraspis viridis*) is equal to 64 opacity reduction units per mgm. of venom in the dry state.

Links of antigenic relationship were demonstrated between the diffusion factors of several venoms, but no immunological relationship could be established between the hyaluronidase of the snake venoms and that extracted from bovine testis.

H. J. O'D. Burke-Gaffney

CORKILL, N. L., IONIDES, C. J. P. & PITMAN, C. R. S. **Biting and Poisoning by the Mole Vipers of the Genus *Atractaspis*.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1959, Jan., v. 53, No. 1, 95–101. [12 refs.]

Snakes of the genus *Atractaspis* possess an unusual degree of flexibility of the neck, which, in addition to their relatively long fangs, makes it dangerous to handle them by holding them just behind the head. This flexibility, combined with the habit of striking with one fang and closed mouth and twining round the victim, suggests an adaptation towards securing their prey in constricted space, presumably underground.

Examination of cases of *Atractaspis* poisoning suggests that while all venoms appear predominately neurotoxic there may be differences between venoms of different species. There are venoms of such low toxicity that deaths are rarities, even in young children. That of *Atractaspis* is on the whole low. The authors give details of 15 cases, 9 being on the fingers of persons apparently accustomed to handling snakes.

There are several factors which affect the amount of venom inoculated, such as being bitten by one fang, and there are also seasonal changes. These variables in conjunction with a venom of comparatively low toxicity seem to account for the low fatality rate of 8·8%—4 deaths in 45 cases. (The two deaths in children, aged 4 and 6, were very rapid, probably because they were bitten at night, and the snake, being a burrower, would bite more efficiently in the dark. The two deaths in men resulted from bites by large specimens. One victim was bitten no fewer than eight times, probably by venous inoculation.)

A true assessment of *Atractaspis* poisoning awaits " further figures of statistical proportions ".

[See also this *Bulletin,* 1955, v. 52, 395.] *Philip Manson-Bahr*

SHULOV, A., GINSBURG, H., WEISMAN, A., FLESH, Y. & DISHON, T. [**The Preparation of an Antivenin against the Palestine Viper by the Use of Fresh Venom**] *Harefuah.* Jerusalem. 1959, Feb. 1, v. 56, No. 3 [in Hebrew 55–7. English summary 58].

The English summary appended to the paper is as follows:—

" Two Awassi sheep were injected with venom of Vipera lebetina var. palestina in three stages: 1) intravenously with toxoid, 2) intravenously with dissolved lyophilised venom and 3) intramuscularly with fresh venom. During stage 3 quantities of 0·025 to 1·5 ml of fresh venom (± 5 to 300 mg) of dry weight were administered.

" A high degree of hyperimmunisation was developed at the end of stage 3 as established by bioassay. 0·1 ml of serum was capable of neutralising 4 LD_{50}; and 0·05 ml of serum neutralised 3·5 LD_{50} of redissolved dry venom. Therefore 1 ml of antiserum would be capable of neutralising 40–70 LD_{50}.

" The present experiments were carried out on the assumption that freshly extracted venom subjected to no treatment would be most likely to contain all the components of the venom injected by the biting serpent.

" Estimation of the potency of anti serum obtained after injection of the dry venom, when tested against homologous dry venom, does not reflect the full

superiority of an antivenin prepared by injections of fresh venom over that prepared by the injection of a solution of dried venom."

TOXOPLASMOSIS

Remington, J. S., Jacobs, L., Melton, Marjorie L. & Kaufman, H. E. **Chronic *Toxoplasma* Infection in a Human Uterus.** [Research Notes.] *J. Parasitology*. 1958, Dec., v. 44, No. 6, 587.

In work under publication the authors, from Bethesda, Maryland, have been studying the possibility of congenital transmission of toxoplasmosis from chronically infected rats to their offspring and have sometimes found the parasites in the uterus of such rats (probably within the pseudocysts).

They have now extended the study to determine the presence of residual *Toxoplasma* infection in the uterus and other tissues of women dying from other causes. Portions of diaphragm, uterus, psoas muscle, and sometimes brain, removed at autopsy, are digested in pepsin and inoculated into mice. Other studies have suggested that the proliferative form of *Toxoplasma* cannot survive digestion, so that infections found in this way may be presumed to be chronic.

From 9 autopsy specimens so far studied *T. gondii* has been isolated from the uterus, diaphragm and psoas muscle in a woman of 57 who died of coronary thrombosis with no history suggesting toxoplasmosis and no histopathological tissue changes suggesting it. She had, however, a dye test titre of 1/256. This evidence, together with the resistance of the parasite to digestion, suggested a chronic infection.

This is the first report of such an isolation from the uterus of a chronically infected woman and it is relevant to the authors' hypothesis that a foetus could be infected through the passage of parasites from a cyst in the uterus because of erosion of the uterine tissue by the developing placenta. Some local proliferation of parasites thus released could occur in the placenta even if antibody were present. If infections occurred in this way, together with passive transfer of antibody, the appearance of the disease in the offspring might be delayed and its manifestations might be more limited.

H. J. O'D. Burke-Gaffney

Soave, O. A. & Lennette, E. H. **Naturally Acquired Toxoplasmosis in the Gray Squirrel, *Sciurus griseus*, and its bearing on the Laboratory Diagnosis of Rabies.** *J. Lab. & Clin. Med.* 1959, Jan., v. 53, No. 1, 163–6, 2 figs.

"The brain of a California gray squirrel (*Sciurus griseus*), a tree-living species, was examined for rabies virus because the animal had been observed to behave in an abnormal manner and had bitten a child. Microscopic examination of smear and imprint preparations of the brain was negative for

Negri bodies but structures with the typical morphologic and staining characteristics of *T. gondii* were encountered. This is believed to afford at least presumptive evidence of natural infection with *T. gondii* in a squirrel."

[See this *Bulletin*, 1957, v. 54, 219, 876.]

DERMATOLOGY AND FUNGUS DISEASES

HITCH, J. M. **Piedra. Report of a Fifth Case originating in the U.S.A.** *Arch. Dermat.* 1959, Jan., v. 79, No. 1, 99–100, 2 figs.

DESTOMBES, P., DUTOUR, J., MARGUET, J., MARIAT, F. & SEGRETAIN, G. Les mycétomes en Côte française des Somalis. [**Mycetomas on the Coast of French Somaliland**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51; No. 4, 575–81, 4 figs. on 2 pls. [13 refs.]

The following is a translation of the authors' summary:—

Of 16 mycetomas from the coast of French Somaliland, 6 were caused by *Madurella mycetomi*, 3 by *Streptomyces madurae*, 6 by *S. somaliensis*, 1 by *Nocardia asteroides*.

In 10 specimens examined by culture, the aetiological agent was isolated in 6. The other cases were diagnosed histologically.

Although the numbers are limited, the results provide nevertheless epidemiological data which make the Somali coast an important marker in our knowledge of the general distribution of mycetomas in Africa.

H. J. O'D. Burke-Gaffney

HUNTINGTON, R. W., Jr. **Morphology and Racial Distribution of Fatal Coccidioidomycosis. Report of a Ten-Year Autopsy Series in an Endemic Area.** *J. Amer. Med. Ass.* 1959, Jan. 10, v. 169, No. 2, 115–18.

The author has studied the morbid anatomy and the distribution by race and sex of fatal coccidioidomycosis from the records of 4,989 autopsies carried out during the years 1947–1956 in Kern County General Hospital. This hospital, situated in an endemic zone in Arizona, receives the indigent sick from the southernmost county of the San Joaquin Valley. Its patients include Caucasians, Mexicans (of mixed Spanish and American Indian blood), Negroes and others; the last group is largely comprised of members of an entirely male Filipino community who live in poor economic circumstances. The incidence and morbid anatomy of two diseases have formed the primary study, namely coccidioidomycosis and tuberculosis, of which the former has been more enthusiastically pursued than the latter.

The histological diagnosis of coccidioidomycosis has been based on the recognition of the pathogenic spherules or the mycelial elements on staining by conventional methods or by the Hotchkiss-McManus technique, or of the mycelium when cultured on Sabouraud's medium. Tuberculosis has been

diagnosed when acid-fast bacilli have been demonstrated in the autopsy specimen, or during life. In arrested, inactive granulomatous lesions the aetiology often could not be determined.

63 deaths were directly attributable to coccidioidomycosis, of which 1 was from acute haemoptysis, 2 from acute suppurative mycotic pneumonia while the remainder resulted from the disseminated disease. The meninges were the most important extra-thoracic focus of the disease, though the meningitis was usually associated with other visceral lesions. Coccidioidomycosis should be considered in the diagnosis of any obscure febrile illness occurring in a person who has been in an endemic area.

99 deaths were attributable to tuberculosis, of which 30 showed localized pulmonary disease, while in the rest the findings indicated wide dissemination. Unfortunately, the meninges were examined only in a minority.

Turning to the incidence of fatal coccidioidomycosis in the different races and sexes, interesting facts have emerged. Caucasians showed the lowest incidence, with equal distribution between the sexes, and Mexicans (no females represented) the next lowest, about 3 times that of the former. Negroes, with an equal sex distribution, showed an incidence 10 times as high as Caucasians, while the Filipino male community showed the highest incidence of all, some 14 times that of the Caucasians.

Regarding the incidence of fatal tuberculosis in this large autopsy series, significant differences emerged between the races and between the sexes of some races. In Caucasians the incidence was lowest and showed no sex variation. In Negro males it was $2\frac{1}{2}$ times as high but in Negro females (2 deaths only recorded) an incidence approximation to that of Caucasians was shown. Mexican males showed an incidence 5 times as great as that of Caucasians, and Mexican females an incidence 9 times as great. The economically depressed male Filipino community had an incidence slightly greater than that of the male Mexicans.

The numbers in the various racial groups of those who showed non-fatal coccidioidomycotic infections were too small to allow any inferences to be drawn.

Risk of exposure to this agrarian disease must obviously vary in differing socio-economic groups, though the same did not apply to tuberculosis. In broad terms this study suggests that Caucasians best resist both coccidioidomycosis and tuberculosis, that the former disease is much more often fatal in Negroes and the latter slightly more dangerous to them. Mexicans of mixed Spanish-Amerindian blood show a resistance to coccidioidomycosis which is intermediate between that of Caucasians and Negroes, but greater susceptibility to tuberculosis than either race. The unfortunate Filipino community, whose mode of life appears exceptionally adverse, to judge from limited numbers, would appear to offer a poor resistance to each disease. *J. H. Walters*

KRUDY, A. G. & HOFF, R. **"Immediate" Type of Coccidioidin Skin Reaction in Pulmonary Coccidioidomycosis.** *Amer. Rev. Tuberculosis.* 1959, Jan., v. 79, No. 1, 78–9.

"A case of an 'immediate' coccidioidin skin reaction with 1:100 and 1:10 dilutions is reported in a 25-year-old white male who had a thin-walled pulmonary cavity. The 'delayed' type of skin reaction at forty-eight hours

was negative. Resection of the pulmonary lesion was performed and *Coccidioides immitis* was demonstrated in sections and was also recovered by culture."

MANSON, M. D. E. **Chromoblastomycotic Brain Abscess in a South African Bantu. Report of a Case.** *South African J. Lab. & Clin. Med.* 1958, Dec., v. 4, No. 4, 283–8, 5 figs. [13 refs.]

"1. A fourth case of brain abscesses due to a dematiaceous (chromoblastomycotic) type of fungus is described. This case occurred in an adult Bantu agricultural worker.

"2. There was no evidence of cutaneous chromoblastomycosis or other extracranial fungal lesion.

"3. It is suggested that pink coloured slender bodies within the hyphae may have led to a misdiagnosis of a tuberculous meningitis in this case.

"4. The extensive destruction of the brain tissue combined with the apparent ability of this fungus to grow through brain tissue suggest that surgical treatment is difficult and the prognosis poor."

COSTELLO, M. J., DEFEO, C. P., Jr. & LITTMAN, M. L. **Chromoblastomycosis treated with Local Infiltration of Amphotericin B Solution.** *Arch. Dermat.* 1959, Feb., v. 79, No. 2, 184–90, 8 figs. [25 refs.] Discussion 190–93.

"A Negro patient with chromoblastomycosis of the ankle, caused by Hormodendrum pedrosoi, was treated for the first time with a series of local subcutaneous injections of amphotericin B dissolved in 2% procaine, with favorable clinical response. After eight injections had been administered over a period of 12 weeks, clinical resolution of the infected area occurred. Follow-up of the patient and further clinical trials of procaine-amphotericin B for chromoblastomycosis are necessary to evaluate fully the effectiveness of the combined medication in the treatment of this fungus disease."

TROPICAL OPHTHALMOLOGY

VELLIEUX, M. & LE BRETON-OLIVEAU, G. La cataracte en Afrique Noire. L'incidence des endemies oculaires associées sur sa cure chirurgicale. **[Cataract in Africa. Incidence of Associated Endemic Eye Diseases in Relation to Surgical Treatment]** *Méd. Trop.* Marseilles. 1958, Nov.–Dec., v. 18, No. 6, 908–22.

The authors discuss 355 cataract extractions undergone by Africans at the Tropical Ophthalmic Institute of Bamako, French Sudan. They studied the effect of associated ocular endemics on the cataract surgery, especially trachoma, onchocerciasis and diseases caused by treponemata, with special reference to secondary glaucoma caused by these diseases and complicating the cataract surgery.

The conditions are discussed fully and the results shown in 8 tables.

D. P. Chovce

Mitsui, Y., Suzuki, A., Hanabusa, J., Minoda, R., Ogata, S., Fukushima, S. & Masako, M. **Structures of the Initial Bodies of Trachoma Inclusion as revealed in Section by Electron Microscopy.** *Virology.* New York. 1958, Aug., v. 6, No. 1, 137–49, 8 figs.

An investigation has been made of the structure of trachoma initial bodies by the examination of ultra-thin sections in the electron microscope. Objects which were of the requisite size, occurring often with elementary bodies within the same inclusion cavity and showing no transitional forms to cell organelles, were considered to fulfil the necessary criteria for identification as initial bodies. Their diameter ranged from 400 mμ to 1,000 mμ; there was an external double membrane, obscure in places, and the margin of the body was sometimes prolonged into pseudopodia. The interior of some bodies contained minute granules, in others the central area was of low density, or else contained a dense central body. The structure of elementary bodies is also described, and the appearances are illustrated in electron micrographs. *D. J. Bauer*

See also p. 643, Van Den Dorpe, L'onchocercose oculaire dans la province du Kasai. [**Ocular Onchocerciasis in the Kasai Province, Belgian Congo**]

HEAT STROKE AND ALLIED CONDITIONS

Haseeb, M. A. & Amin, F. **Fatal Effects of Heat on Man.** *J. Trop. Med. & Hyg.* 1958, Nov., v. 61, No. 11, 280–81.

In this appalling catastrophe in 1956 more persons (187) died from heat hyperpyrexia than in the Black Hole of Calcutta (123 deaths). Death was due to incarceration of 281 villagers overnight in a " prison ward " of Kosti town, Sudan, after a 90-mile journey by truck in the midday sun. The " ward " was 19 × 5·5 × 3·8 metres high and was unventilated. Of 11 other sick persons, 7 died on the way to, or in hospital with typical hyperpyrexia.

Sweating was so profuse that " the floor of the ' ward ' was flooded ". Post-mortem examination showed no specific signs of heat injury.

M. L. Thomson

MISCELLANEOUS DISEASES

Shaper, A. G. & Shaper, Lorna. **Analysis of Medical Admissions to Mulago Hospital, 1957.** *East African Med. J.* 1958, Dec., v. 35, No. 12, 647–78, 4 figs. [29 refs.]

This is a valuable study but difficult to abstract. It is primarily a record of the diagnosis made on 2,845 in-patients admitted to the medical wards of

Mulago Hospital, Kampala, during 1957. Of these 405 died and post mortems were performed on 205. Some differentiation by sex, age, tribe and geographical distribution is attempted. The chief value of these figures lies in their availability for comparison with other similar records and the hope is expressed that the changing pattern of disease will be more easily discernible as yearly records become available. Comparisons are made with reports from Britain and other parts of Africa and with earlier observations made in Kampala. Special tribute is paid to the carefully documented pioneer observations of the late Sir Albert Cook, published in 1901.

Lobar pneumonia was the commonest single cause of admission and carried a mortality rate of 14·5% for males and 3·5% for females. Jaundice was present in 12·5%. There were 70 patients admitted with pneumococcal meningitis and of these 43 died. The comparable figures for unspecified meningitis were 30 (15 deaths) and for meningococcal meningitis 6 (0 deaths). The authors report that an intensive investigation is being pursued into the high mortality rates in meningitis and chemotherapeutic trials are in progress.

Trypanosomiasis is noted as an occupational disease of fishermen. It is recorded that there was only 1 death among 7 admissions although the cerebrospinal fluid was altered in all and the species is (rather surprisingly) attributed to *Trypanosoma rhodesiense* in the majority.

In spite of the authors being " brucellosis-conscious " there were only 4 patients admitted with brucellosis. These came from a focus in the south-west district of Uganda.

Typhus was diagnosed in only 18 patients. These were thought to be almost exclusively suffering from murine typhus but it is not clear whether specific rickettsial antigens were used. Tetanus, with 11 admissions, is much less prevalent than in Ibadan.

Endomyocardial fibrosis, cirrhosis of the liver, primary carcinoma of the liver and unexplained splenomegaly remain important problems.

The figures show an increase in admissions for essential hypertension (perhaps reflecting increased interest in this subject) and primary amyloidosis of the kidney is being increasingly recognized by renal biopsy.

Hookworm is considered to be by far the commonest cause of anaemia and the difficulty of recognizing congestive cardiac failure in this condition is stressed. Sickle-cell anaemia was diagnosed in 12 patients, 6 being between the ages of 12 and 27 years. [Survival to this age is interesting and clarification as to whether the patients were suffering from homozygous S sickle-cell anaemia, or from sickle-cell disease due to other abnormal haemoglobin combinations, would be desirable.]

5 patients were found to have carcinoma of the lung. No tuberculoma of the brain was found, in contrast to experience in other parts of Africa.

With regard to diseases common in Britain but rare in Africa, there were 5 admissions for rheumatoid arthritis but no case of coronary artery disease was diagnosed although myocardial degeneration attributed to gradual ischaemia from arteriosclerotic narrowing of the coronaries was diagnosed in 3 patients between the ages of 65 and 72.

An attempt to relate the admissions of certain diseases to rainfall is made.

[An interesting record. Comparison with experience elsewhere may help to unravel the ecology of disease as well as emphasizing diseases of local importance.] *Frederick J. Wright*

GELFAND, M. **Cardiac Disease of Obscure Origin in Africa.** *Central African J. of Med.* 1958, Sept., v. 4, No. 9, 365–71, 2 figs. [15 refs.]

This paper consists of an admirable review of the literature concerning endomyocardial fibrosis and related cardiopathies [for references see, for example, this *Bulletin,* 1956, v. 53, 1053], followed by a description of cases of cardiac failure of obscure origin encountered by the author in Mashonaland. The prognosis in these has been poor but at autopsy there has been little abnormality in the chambers of the heart, the endocardium or myocardium, although in some there has been extensive ante-mortem clotting, particularly in one or other of the auricular appendages or at the apex of the left ventricle. In these areas the endocardium has been white and opaque and the underlying myocardium paler than the remainder. The papillary muscles have frequently been similarly affected and not uncommonly a pericardial effusion has been found. In spite of the presence of thrombi, emboli have been rarely encountered in these cases.

Heart failure of this type often develops in African women who have recently given birth and nutritional deficiencies have been suspected as a cause but the patients have not responded to treatment with thiamine, nicotinic acid or proteins. [Damage caused or fibrous tissue resulting from malnutrition, however, would not necessarily be restored to normal or absorbed by placing the patient on a good diet.] The author not infrequently finds slightly or moderately enlarged hearts in young Africans in whom there is no complaint referable to the heart but who have malaria, hookworm infection or schistosomiasis, and it is suggested that some of these patients later " develop the fully fledged picture of congestive cardiac failure ". There follows a description of a European woman aged 40 who died of heart failure approximately three months after giving birth to an infant. At autopsy there was an extensive mural thrombus in the left ventricle and beneath this there was a diffuse zone of subendocardial fibrosis. The uterus was also found to contain purulent material. *A. W. Woodruff*

KHAN, A. A. **Duodenal Ulcer amongst Africans in Nairobi.** *East African Med. J.* 1958, Dec., v. 35, No. 12, 679–84, 3 figs.

" 1. Duodenal ulcer is on the increase amongst Africans.
" 2. It affects all income, social and educational groups.
" 3. It is a disease of young and middle-aged Africans (18–40 age group). This is the age group which is likely to suffer the maximum conflicts, fears and frustrations.
" 4. The signs and symptoms do not differ appreciably from the recognized classical cases.
" 5. Medical treatment is extremely beneficial and the treatment of choice.
" 6. As more Africans will start to leave their reserves and take to city life there will be a corresponding rise in duodenal ulcers every year.
" 7. Duodenal ulcer is no longer a rare disease."

[For references to other records from Africa, see this *Bulletin,* 1958, v. 55, 1171.]

SINGH, A., JOLLY, S. S. & BALASUBRAHMANYAN, M. **Indian Childhood Cirrhosis.** *Brit. Med. J.* 1959, Jan. 31, 278–9, 1 fig.

The authors have investigated 33 children suffering from cirrhosis, at Patiala, in the Eastern Punjab. The ages of their patients ranged from 9 months to 7 years, the majority being 1–3 years old. All but 3 were males.

The authors recognize two distinct syndromes, the acute and the subacute. Children falling into the former group comprised about equal numbers of Sikhs (meat eating) and Aggarwal Banias (strictly vegetarian Hindus); their average age at onset was less than in those with the subacute disease—1·28 years as opposed to 2·40 years; both males and females were affected and there was no familial incidence. The condition manifested itself acutely with signs of hepato-cellular damage, rapidly increasing hepatosplenomegaly and ascites; the majority of patients died quickly of liver cell failure. In the subacute group vegetarians predominated, the patients were all males, and in 55% of cases other siblings had been similarly affected. Hepatosplenomegaly developed more slowly and though many died in a state of frank hepatic cirrhosis, a minority recovered.

The histopathological features were demonstrated in 22 patients by liver biopsy. Evidence of cirrhosis was seen in 19 [though there is a disappointing lack of precise information as to its pattern and mode of development]. The initial lesion was apparently in the parenchymal cells, which were often vacuolated and showed acidophil aggregations in degenerate cytoplasm. "Other cases showed more definite inclusions." The authors are emphatic that, though the clinical picture in the acute type of case might bear a superficial resemblance to veno-occlusive disease, there were no histopathological features suggestive of this disease, while the invariably fatal termination distinguished the Indian disease from veno-occlusive disease.

In a brief discussion of possible aetiological factors, the authors dismiss the possibility of a toxic factor in food and suggest that the acute form of the disease may be due to a viral infection. In the subacute form of the disease, on account of the disproportionate number of males who are affected, the familial incidence and the comparative frequency of its occurrence in one defined sect, a sex-linked genetic factor may be responsible.

[This paper is admirable as far as it goes, but those interested in liver disease in childhood will be disappointed at the lack of detailed information.]

J. H. Walters

KARIKS, J. **Tropical Pulmonary Eosinophilia.** *Med. J. Australia.* 1958, Dec. 6, v. 2, No. 23, 773–5. [19 refs.]

The author records 5 typical examples of tropical pulmonary eosinophilia all of which originated in New Guinea or in Bougainville Island. This article begins with a clear account of the symptoms, physical signs and diagnosis of the disease, all of which are too well known to require repetition. The first four patients were indigenous males.

(1) A native of the Rabaul area of New Britain aged 40, after an initial diagnosis of pulmonary tuberculosis had been made, was found to be carrying the larvae of *Wuchereria bancrofti* in his blood. On treatment with Banocide (diethylcarbamazine) rapid clinical, radiological and haematological improvement ensued. (2) A native of the same district, aged 30 years, was also proved

to be harbouring *W. bancrofti*: he too made a rapid recovery on Banocide. (3) A native of this same district, aged 20, but in whose blood microfilariae of *W. bancrofti* could not be demonstrated: nevertheless, on Banocide treatment a prompt recovery ensued. (4) A native of Bougainville, aged 25 years, showing larvae of *W. bancrofti* in his blood, also recovered quickly on the same treatment. The fifth patient was a European woman of 35 years, who had been resident on Bougainville for an unspecified number of years; she developed typical symptoms and showed an eosinophilia of 20% of 12,600 leucocytes per cmm. No search for microfilariae and no radiological examination were made. Complete symptomatic recovery followed 4 weeks' treatment with Banocide.

In a review of the literature [which omits Buckley's recent and important publication on the induction of the disease in a human volunteer by infecting him with a strain of *W. malayi* of animal origin, this *Bulletin*, 1958, v. 55, 1356] the author points out that the reported foci of the disease all fall within the zone of the filarial diseases.

[Few workers with experience of bancroftian filariasis and of tropical pulmonary eosinophilia will accept on the evidence presented the author's statement that " The five cases described leave very little doubt that *W. bancrofti* was the primary causative factor in this series ". The fact that, in 3 out of the 4 patients in whom a search was made, the presence of one filarial disease was established, lends some support to the suggestion that the disease might actually have been caused by an additional, different and cryptic filarial infection that was unable to establish itself equably in the body of man.] *J. H. Walters*

MEHTA, R. S. **Electrocardiographic Changes in Tropical Eosinophilia.** *Indian J. Med. Sci.* 1958, July, v. 12, No. 7, 539–44, 2 figs.

" 1. A report of electrocardiographic changes in 80 selected cases is being presented for the first time.
" 2. Changes of hyperkalemia were seen in about 46 per cent of the cases.
" 3. Left ventricular hypertrophy was present in 30 per cent of the cases.
" 4. Right ventricular hypertrophy was present in 12·5 per cent of the cases.
" 5. Vertical or semi-vertical position was present in about 80 per cent of the cases."

EMMONS, Patricia & MCLENNAN, H. **Failure of Acetylcholine Release in Tick Paralysis.** [Correspondence.] *Nature.* 1959, Feb. 14, v. 183, 474–5.

YOUNG, K. **The Haw-Haw Syndrome.** *East African Med. J.* 1959, Jan., v. 36, No. 1, 44–7, 2 figs.

"The berries of *Grewia tenax* are eaten in Somaliland and impaction of the pips in the rectum is not uncommon, particularly in children. In part of the country the Somalis have designed a special wooden spoon with which to remove the pips."

PARASITOLOGY: GENERAL

DOMINICI, L. M., MICHELONI, F., BIGOTTO, M. R. & PIVA, F. Diffusione delle parassitosi intestinali fra la popolazione infantile della Repubblica di San Marino. Considerazioni clinico-epidemiologiche. [**Intestinal Parasites in the Child Population of the Republic of San Marino**] *Igiene e San. Pubblica.* Rome. 1958, Nov.–Dec., v. 14, Nos. 11/12, 628–44. [38 refs.] English summary.

All pupils in the elementary schools of the Republic (approximately 1,600 aged 6–12 years) along with some children below the age of 6 years and some adults, were examined both in the urban and rural areas. Examinations included, besides direct microscopical and concentration methods of the faeces, a modified Graham's method for *Enterobius*. All those found negative at the first examination were re-examined several times.

In examination of 296 children up to 6 years, 26 were found positive, 8 of whom had *Ascaris*. In 1,500 children aged 6–12 years, 1,049 were found to be positive. In 120 persons over 21 years examined, 15 were found to be positive. The age-group most affected was 8–11 years, but *Trichuris* and *Enterobius* were found even in babies under 1 year old. Up to 6 years of age, children in the urban areas were most affected, but the reverse was the case after this age.

As regards individual helminths, 190 out of 1,776 children aged 3–13 years had *Ascaris*, 23 in the same group *Hymenolepis*, and 31 *Anguillula* [*Strongyloides*]. 434 subjects of all ages had *Enterobius*, and 714 *Trichuris*. Many had two or more helminths. No *E. histolytica* were found at all, and the authors are surprised at the absence of hookworm in view of the finding of *Anguillula* and having regard to the nature of the soil and the habits of the population. They consider that in early childhood intestinal helminths can cause generalized symptoms especially in the first 3 years of life; in children of school age *Ascaris* is particularly important, while those with *Anguillula* showed no definite pathological symptoms.

They conclude that in San Marino intestinal helminthiasis is prevalent, especially between the ages of 6 and 12 years, but it should not be ignored in infancy. It is more common in the rural areas because of the low level of hygiene. An active campaign of prevention based on a rational plan should be undertaken, which should include compulsory treatment of carriers, improvement of the general hygienic conditions, intensive education, etc.

W. K. Dunscombe

MYERS, E. N., NEGRÓN, R. & PEARLSTEIN, H. **Intestinal Parasitoses in Puerto Rican Preschool Children at Philadelphia, Pennsylvania in 1958.** *Amer. J. Med. Sci.* 1959, Jan., v. 237, No. 1, 59–66, 1 fig.

"One hundred and seventy Puerto Rican children under 6 years of age, living in Public Health District No. 6 of Philadelphia, were examined for parasitic infestation. An over-all incidence of 41·1% infestation was found; this was demonstrated by repeated stool specimens.

"The most common parasites found in these children were *T. trichiurus* and *G. lamblia*. *G. lamblia* was the most common parasite in children born in the United States and in children born in the United States who had gone to

Puerto Rico for a visit and then returned here. *T. trichiurus* was the most common parasite among children born in Puerto Rico.

"Some correlation was found between overcrowded living quarters, poor home sanitation, and high incidence of parasitic infestation. It was also shown that the incidence of parasitic infestations increased as the children became older."

See also p. 675, GUINN, **The Use of the Zinc Sulfate Centrifugation Flotation Technic as a Routine Diagnostic Procedure.**

CH'IEN, Hsin-Chung. **Summing up of Mass Technical Experiences with a View to expediting Eradication of the Five Major Parasitic Diseases.** *Chinese Med. J.* Peking. 1958, Dec., v. 77, No. 6, 521–32.

This is an interesting report by the Vice-Minister of the Ministry of Public Health in the Chinese Republic. The Draft Programme for Agricultural Development in 1956 asked for the eradication of diseases dangerous to the health of the people and as a result mass campaigns have been undertaken against 5 major parasitic infections, namely schistosomiasis, malaria, filariasis, kala azar and ankylostomiasis. These are important and widespread diseases and astonishing results have already been achieved in the control campaigns. Schistosomiasis has been basically eliminated already in half the endemic areas and complete elimination is envisaged. Country-wide eradication of malaria by 1960 is not impossible and it is anticipated that kala azar will be wiped out in 1959 and ankylostomiasis in 1960. Details of the progress made and the methods employed are given in the article.

Even more interesting perhaps, to medical workers in western countries, is an account of the factors responsible for the remarkable progress alleged. First of these is the leadership of the Chinese Communist Party which mobilizes the whole people in the campaign so that quick results can be obtained. The Party also controls the activities of all medical personnel from the specialist down to the lowest field workers, and it directs the trend of research so as to ensure industrial and agricultural production. Treatment combines scientific and traditional Chinese remedies, and the practice of acupuncture is being encouraged. It is admitted that problems still remain, the spirit of collectivism is not yet strong enough and the crying needs of prevention and treatment work are not clearly understood. *T. H. Davey*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

GILLIES, M. T. **A Simple Autoradiographic Method for distinguishing Insects labelled with Phosphorus-32 and Sulphur-35.** [Correspondence.] *Nature.* 1958, Dec. 13, v. 182, 1683–4, 1 fig.

The use of a single radioisotope in insect-marking experiments suffers from the disadvantage that further release of radioactive insects can only be done

when it is certain that there are no survivors from the first release. This difficulty was overcome by making use of the different radiation energies of phosphorus 32 and sulphur 35; both emit beta particles, the former with an energy of 1·71 MeV and the latter of only 0·167 MeV. The low emission energy of the beta particles from sulphur 35 was found to be insufficient to permit blackening of photographic emulsion through one thickness of X-ray film. Thus *Anopheles gambiae* labelled with the above isotopes could be separated; those producing a blackened image through two layers of film were identified as having been tagged with phosphorus 32, while blackening of the top layer of film only indicated sulphur 35. Differences in image sharpness were also useful in distinction.

A suggestion is made that mosquitoes labelled with both phosphorus 32 and sulphur 35 could be recognized by reason of the long half-life (87·1 days) of sulphur 35. Initial exposure would reveal the high penetration of the phosphorus 32 beta particles; the specimens could then be kept to allow the phosphorus isotopes to decay and re-exposure would reveal the persisting, low energy, penetration of sulphur 35.

In this way three overlapping groups of tagged mosquitoes could be released.

E. R. Nye

WEIDHAAS, D. E. & GAHAN, J. B. **Effect of Certain Changes in Testing Technique on Mortality of Mosquito Larvae.** *Mosquito News.* 1958, Dec., v. 18, No. 4, 275–9.

Tests with insecticides on mosquito larvae are important in comparing chemicals as larvicides, in bioassay and especially in tests for insecticide resistance. These experiments are difficult to standardize and often give erratic results. Several workers have investigated the effects of various factors on the tests [*e.g.*, KRUSE *et al.*, this *Bulletin*, 1953, v. 50, 87; HAWKINS, *ibid.*, 1957, v. 54, 394; and PARKER, *ibid.*, 1958, v. 55, 106].

The present authors have continued these attempts to improve technique using *Anopheles quadrimaculatus* and *Aëdes taeniorhynchus* exposed to DDT suspensions. They measured the susceptibility of these species as 2nd, 3rd and 4th stages. With 4th stage larvae, they found no significant effect in altering the volume of test suspension ($\frac{1}{4}$ to 1 litre for 25 larvae), the quantity of acetone used (1 to 5 ml.), or the method of making dilutions, and there was no significant difference in mortality between larvae starved for 4 hours and those freshly fed.

J. R. Busvine

SCHMIDT, C. H. & WEIDHAAS, D. E. **Absorption and Toxicity of Three Radioactive Insecticides in Larvae of Two Species of Mosquitoes.** *J. Econom. Entom.* 1958, Oct., v. 51, No. 5, 640–44, 3 figs.

In screening compounds as larvicides for mosquito control it has been general practice to assess their effectiveness by correlating the percentage mortality with the concentration of the insecticide in which the larvae are tested. The authors have gone a step further and determined the actual uptake of three chemicals (DDT, Bayer 21/199 and Am. Cyanamid 12880) in water suspension or solution by larvae of *Anopheles quadrimaculatus* and *Aëdes taeniorhynchus*. Radioactive tracer techniques were employed, and the radio-

activity present in the larvae assayed by a windowless gas-flow proportional counter.

DDT was the most effective insecticide with both species, Am. Cyanamid 12880 the least. "*A. quadrimaculatus* were more susceptible to DDT and 12880 but less to 21/199 than *taeniorhynchus*." The slope of the concentration-mortality regression lines did not vary much between species and insecticides. The data for the absorbed dosage presented a different picture, with smaller differences between the insecticides, especially in *A. quadrimaculatus* which, in fact, showed lower absorbed dosages of all three insecticides than *taeniorhynchus*, except at the higher mortality level with Bayer 21/199. The slope of the absorbed dosage-mortality regression lines varied considerably between species and insecticides.

"*A. quadrimaculatus* larvae exposed to 21/199 for 48 hours absorbed a maximum amount in the first few hours but the mortality increased with time. When *quadrimaculatus* larvae were transferred to clean water, 73% of the acquired dosage of 21/199 was excreted in 12 hours." Live larvae of both species absorbed more 21/199 than did larvae killed with carbon dioxide. An increase in the number of *A. quadrimaculatus* larvae per unit volume resulted in lower mortalities with DDT but no change with 21/199 and 12880.

R. J. Wood

HEDEEN, R. A. **A Review of the Mosquito Larvae of France. I. Genera *Culiseta, Mansonia, Orthopodomyia* and *Uranotaenia*.** *Mosquito News*. 1958, Dec., v. 18, No. 4, 308–21, 8 figs. [17 refs.]

"A review of the larvae of the culicine mosquitoes of France which belong to the genera *Culiseta, Mansonia, Orthopodomyia,* and *Uranotaenia* is presented. A key for distinguishing all the genera reported from the country is included as well as a key to the species of the genus *Culiseta*. Distinguishing characteristics of the species of the other genera included in this paper are emphasized, and a brief consideration of the genus *Anopheles* is included.

"Distribution records reported by previous writers are compiled, and collection records of the Army Medical Service during the period of 1953 to 1956 are presented."

WATTAL, B. L., BHATIA, M. L. & KALRA, N. L. **Some New Records of Culicines of Dehra Dun (Uttar Pradesh) with a Description of a New Variety.** *Indian J. Malariology*. 1958, Sept., v. 12, No. 3, 217–30, 1 map & 3 figs. [25 refs.]

SENEVET, G. & ANDARELLI, L. Le genre *Aedes* en Afrique du Nord. II.—Les nymphes. [**The Genus *Aëdes* in North Africa**] *Arch. Inst. Pasteur d'Algérie*. 1958, June, v. 36, No. 2, 266–86, 5 figs.

HAMON, J. & ADAM, J. P. Description de deux nouveaux *Aedes* appartenant au groupe *tarsalis* Newstead en Basse Côte-d'Ivoire (A.O.F.): *A. (Aedimorphus) reali* sp. n. et *A. (Aedimorphus) nyounae* sp. n. [**Description of Two New *Aëdes* belonging to the *tarsalis* Group in the Lower Ivory Coast, French West Africa; *Aëdes (Aëdimorphus) reali* and *Aëdes (Aëdimorphus) nyounae***] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 530–34, 2 figs. [14 refs.]

SENEVET, G., ANDARELLI, L. & MONPÈRE, H. *Aedes aegypti* à Alger. [*Aëdes aegypti* **in Algiers**] *Arch. Inst. Pasteur d'Algérie.* 1958, Dec., v. 36, No. 4, 506–7.

Aëdes aegypti was formerly a common mosquito in the Algiers area, but in the last 20 years it seems to have become rare. Some authors have suggested that *Aëdes aegypti* has tended to disappear from North Africa and the present authors point out that because of implications regarding the possibility of yellow fever in the Algerian Coast, this opinion requires to be verified.

In fact they quote figures showing the absence of this species from mosquito collections in several urban, suburban and rural districts in the area. For example, since May 1954 records from the entomological laboratory show that not a single *Aëdes aegypti* was found in collections amounting to about 9,000 adults, 1,800 pupae and 29,000 larvae (however, most of these were taken in rural breeding places).

To determine whether *Aëdes aegypti* had actually disappeared from Algiers or merely diminished in number, the authors examined a site in Algiers where this species had been found in 1939. They found 1 male and 1 female in the gate-lodge of a cemetery and the next day about 40 larvae were collected in a flower-container on a grave. Larvae and adults were found on the same day in another adjacent cemetery.

It is clear that *Aëdes aegypti,* despite its rarity, is permanently present in the Algiers area and, the authors add, probably in most of the coastal towns of North Africa. *H. J. O'D. Burke-Gaffney*

SURTEES, G. **Influence of Larval Population Density on Fluctuations in Mosquito Numbers.** [Correspondence.] *Nature.* 1959, Jan. 24, v. 183, 269–70, 1 fig.

Previous work [in the press] by the author indicated that fluctuations in the numbers of *Aëdes aegypti* throughout the year in a Nigerian village were not wholly explicable by changes in external environmental factors. In further studies, weekly yields of larvae and pupae (pre-adult forms) of the mosquito were counted in the water of clay pots distributed about the village. This was taken as the basis of an index calculated for the density of the breeding population of adults; observations were made for a year. Fluctuations in density of adults were thought to be due to a density effect on larvae and pupae in breeding places.

A series of cultures were set up in the laboratory. These were standardized except for the number of larvae which ranged from 10 to 70. Adults emerged by the 14th day and there was no larval or pupal mortality if only 10 or 20 larvae were present. With 40 or more larvae, development reached only second or third larval stage in 14 days, and mortality was finally 100%. [There seems to be a misprint in the table of 10·00 for 100·0.] An intermediate result was obtained with 30 larvae initially present.

It is suggested that, in nature, a similar density-dependent factor operates in breeding places to inhibit the growth and increase the mortality of the pre-adult forms when oviposition is heavy. This in turn reduces the breeding population of adults to a point at which maximal rates of development and emergence may again become possible. *D. S. Bertram*

Colless, D. H. **Notes on the Culicine Mosquitoes of Singapore. IV.—The *Aëdes niveus* Subgroup (Diptera, Culicidae): Introduction and Description of Five New Species and of One New Subspecies.** *Ann. Trop. Med. & Parasit.* 1958, Dec., v. 52, No. 4, 468–83, 8 figs. [14 refs.]

Bourgain, M. Présence de *Phlebotomus* (*Larroussius*) *perniciosus* Newstead 1911 en Lozère. [*Phlebotomus perniciosus* **in Lozère, France**] *Bull. Soc. Path. Exot.* 1958, July–Aug., v. 51, No. 4, 534–5.

Abonnenc, E. & Larivière, M. *Phlebotomus duboscqui* Neveu-Lemaire, 1906 (Diptera-Psychodidae). Morphologie de l'oeuf et des formes larvaires. [*Phlebotomus duboscqui*. **Morphology of the Egg and Larvae**] *Arch. Inst. Pasteur d'Algérie.* 1958, June, v. 36, No. 2, 259–65, 4 figs.

Fairchild, G. B. & Hertig, M. **Notes on the *Phlebotomus* of Panama, XIV (Diptera, Psychodidae) *P. vespertilionis* and Related Species.** Reprinted from *Ann. Entom. Soc. of America.* 1958, Nov., v. 51, No. 6, 509–16, 21 figs. on 3 pls.

"A key is given to the males of the seven known Central American species of this group, and a partial key to the females; among the seven there are three pairs of species whose females are not distinguished from one another. New species are: *P. viriosus,* Panama and Costa Rica; *P. steatopygus,* Chiapas; and *P. isovespertilionis* (= *P. vespertilionis*, part, F. & H. 1947), Panama. Notes on distribution and habitats are given for *P. deleoni* F. & H., *P. vesciferus* F. & H., *P. beltrani* Vargas & Diaz Najera, and *P. vespertilionis* F. & H."

Clastrier, J. Notes sur les Cératopogonidés. IV.—Cératopogonidés d'Afrique Occidentale Française. [**Notes on Ceratopogonids. IV. Ceratopogonids of French West Africa**] *Arch. Inst. Pasteur d'Algérie.* 1958, June, v. 36, No. 2, 192–258, 52 figs. [20 refs.] **V.** *Ibid.,* Dec., No. 4, 487–505, 15 figs.

Vargas, L. Los Culicoides o Jejenes de México (Insecta; Diptera). Claves gráficas para la determinación de los subgéneros. [**Graphic Keys to the Subgenera of Mexican Culicoides**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1958, June, v. 18, No. 2, 75–80.

The English summary appended to the paper is as follows:—

"The thirty-two species of Mexican *Culicoides* fall in seven of the eight known subgenera. Graphic keys for a faster and easier identification of the subgenera are given, as well as results of their application to the taxonomy of species from Japan and Korea."

COLE, M. M. & WILSON, H. G. **Effect of a Combination of Unrelated Synergists on the Toxicity of Pyrethrins to Body Lice and House Flies.** *J. Econom. Entom.* 1958, Oct., v. 51, No. 5, 742–3.

Results are given of an investigation to determine whether a mixture of two dissimilar compounds as synergists for pyrethrins was more effective than either synergist used separately.

IN-930 (N-isobutylundecenamide) was used in conjunction with two other compounds: sulfoxide (1,2-methylenedioxy-4-[2-(octylsulfinyl) propyl] benzene) in tests against the body louse, *Pediculus humanus humanus* [the beaker method, EDDY *et al.*, this *Bulletin,* 1954, v. 51, 1312]; and piperonyl butoxide against *Musca domestica* (the wind tunnel method, LATRECQUE and WILSON, *Agric. Chemicals,* 1957, v. 12, 46, 147, 149).

Against body lice, the combination of sulfoxide and IN-930 was no more effective than sulfoxide alone but had more effect than an equal concentration of IN-930. Likewise against house-flies, a mixture of the two compounds was no more effective than piperonyl butoxide alone but was better than IN-930.

R. J. Wood

DAVIES, M., KEIDING, J. & VON HOFSTEN, C. G. **Resistance to Pyrethrins and to Pyrethrins-Piperonyl Butoxide in a Wild Strain of *Musca domestica* L. in Sweden.** [Correspondence.] *Nature.* 1958, Dec. 27, v. 182, 1816–17.

The first published case of resistance to pyrethrins by *Musca domestica* has been demonstrated in fly collections made at a farm (Wasa) near Stockholm. These premises had been treated for one year with commercial preparations containing 0·075% pyrethrins and 0·6% of the synergist piperonyl butoxide. This strain had already shown a high resistance to many of the chlorinated hydrocarbons and some resistance to parathion.

Tests involving the topical application of a mixture of pyrethrins and piperonyl butoxide (1 : 10) dissolved in acetone demonstrated that the LD50 of the resistant strain was 11 to 14 times normal. This is thought to be partly due to non-specific factors (" vigour tolerance ") and partly to specific mechanisms.

A modification of the direct spray method of KEARNS and MARCH (*Soap,* 1943, v. 19 (i), 101) showed the Wasa strain to be 12·5 times resistant to pyrethrins and 10·7 times to a mixture of pyrethrins and piperonyl butoxide (1 : 8). Resistance to the knockdown effect of these insecticides was also demonstrated. A cross-resistance was shown to allethrin (150 times) and to an allethrin piperonyl butoxide mixture (45 times).

There has been increasing difficulty in killing flies with pyrethrum insecticides, both dusts and aerosols, in several other places in Sweden, but the resistance has not been measured by laboratory tests.

R. J. Wood

ASCHER, K. R. S. **Chemicals affecting the Preimaginal Stages of the Housefly. VII. The Contact Toxicity of some Alkyl Bromo- and Chloroacetates for Third Stage Larvae.** *Riv. di Parassit.* Rome. 1958, Apr., v. 19, No. 2, 139–55, 2 figs. [28 refs.]

Third stage prepupating larvae of a multi-resistant (K_1) and susceptible (S) strain of *Musca domestica* were placed on filter paper impregnated with alkyl

bromoacetates, alkyl chloroacetates and gamma BHC in closed and open Petri dishes. It was found that the lauryl radical and the high molecular weight of the bromo- and chloroacetates were the main factors in the contact toxicity. Vapour phase action did not appear to play any important part among the alkyl bromoacetates; it did, however, with the decyl and lauryl chloroacetates and especially with gamma BHC. The log-dosage probit lines of the K_1 strain for the lauryl bromoacetate were very steep and identical in both open and closed dishes. They intersected those for gamma BHC which showed differences owing to different gaseous concentrations in open and closed tests. Previous work done by ASCHER [this *Bulletin,* 1957, v. 54, 1253], BETTINI and BOCCACCI (*Tenth International Congress of Entomology,* Montreal, August 1956) and MELTZER (*Med. Landb. & Opzoekingstat., Staat de Gent,* 1956, v. 21, 459) on other compounds, together with the present experiment, point out the fact that a steep slope is associated with compounds which prevent the development of resistance in house-flies, and also with substances characterized by a single pattern of action, *e.g.,* inhibition of cholinesterase, while a flatter slope is exhibited by those which allow a quick build-up and act on several enzyme systems. *V. D. Nguy*

FALES, J. H. & BODENSTEIN, O. F. **Aerosols Vs. House Flies. Tests of Aerosols against Native Strains of House Flies add further Evidence that a More Realistic View must be taken.** *Soap.* New York. 1958, Dec., v. 34, No. 12, 115–17, 121.

The authors consider that, with the increasing prevalence of resistance in house-flies, the evaluation of new household aerosols should not be based on tests with laboratory colonies; instead, freshly collected field strains should be used. They tested 3 such strains with 6 types of aerosol using the Chemical Specialties Manufacturers Association method of flying insects [this *Bulletin,* 1957, v. 54, (891)].

The results varied from strain to strain but certain general conclusions could be drawn. It seemed clear that (i) new aerosol preparations should not depend on a chlorinated hydrocarbon as their main killing agent, (ii) the level of active ingredients will have to be increased, and (iii) much more study of the variation between local populations of house-flies is needed. *R. J. Wood*

EYDAN, R. Un cas de myiase oculaire à *Oestrus ovis* L. observé à Guerrara (Mzab). [**A Case of Ocular Myiasis due to** *Oestrus ovis* **seen in Guerrara, Algeria**] *Arch. Inst. Pasteur d'Algérie.* 1958, Dec., v. 36, No. 4, 485–6. [12 refs.]

FAVIER, G. Un cas de myiase oculo-nasale à *Oestrus ovis* observé dans l'annexe de la Saoura (Sud Oranais). [**A Case of Oculo-Nasal Myiasis due to** *Oestrus ovis* **seen in the South Oran Area**] *Arch. Inst. Pasteur d'Algérie.* 1958, June, v. 36, No. 2, 182–3. [11 refs.]

STARKOFF, Oleg. **Ixodoidea d'Italia.** [The Ticks of Italy] Studio monografico 385 pp., numerous illustrations. 1958. Rome: "Il Pensiero Scientifico" Editore, Via Brenta 13, Italy. [L.4,500.]

This monograph is a valuable contribution to knowledge on ticks, dealing with this group within Italy, Sardinia, Sicily and some smaller islands around the Italian coast. The number of species reported is as follows: *Argas* (4), *Ornithodorus* (2), *Ixodes* (7), *Hyalomma* (4), *Dermacentor* (1), *Haemaphysalis* (3), *Rhipicephalus* (2), *and Boophilus* (1). Due regard is taken of studies in recent years by others on problems of speciation, *e.g.*, in *Rhipicephalus* and *Hyalomma*. There is an opening historical account of ticks in Italy tracing back to ancient times.

The main text, preceded by a glossary of terms, a general treatment of tick external morphology and an account of the life-cycle of ticks, provides keys to and descriptions of the ticks. There are a few line drawings but illustrations are mostly photomicrographs of transparent mounts of ticks or part of them. The literature for each species within the area of study is briefly summed in chronological order, followed by notes of the author's own records and a brief indication of other countries in which a species occurs in the European and Mediterranean region. Some biological notes and indications of vector significance are also given.

There are several tables at the end of the work summarizing the hosts on which the different species are found, what stages are found on different hosts and at which seasons of the year. A great deal of interesting data on tick and host relationships are compounded in these tables and the text. It is clear that the author's own work has contributed much of this information. Species distribution is presented in tabular form and clearly on a map. References number about 600. *D. S. Bertram*

VARGAS, L. Clave para identificar los géneros de garrapatas adultas de México. [**Key to the Genera of Mexican Adult Ticks**] *Rev. Inst. Salubridad y Enfermedades Trop.* México. 1958, June, v. 18, No. 2, 67–74, 4 graphs.

The English summary appended to the paper is as follows:—

"The author presents keys for the identification of the ten genera of Mexican ticks. In the family Argasidae are included *Argas, Antricola, Ornithodoros* and *Otobius,* in Ixodidae are *Ixodes, Haemaphysalis, Boophilus, Amblyomma, Dermacentor* and *Rhipicephalus.*"

COLHOUN, E. H. **Acetylcholine in *Periplaneta americana* L. III. Acetylcholine in Roaches treated with Tetraethyl Pyrophosphate and 2,2,-bis(*p*-Chlorophenyl)-1,1,1-Trichloroethane.** *Canadian J. Biochem. & Physiol.* 1959, Feb., v. 37, No. 2, 259–72, 3 figs. [25 refs.]

"The levels of acetylcholine (ACh) in the thoracic nerve cords of cockroaches were increased by the topical application of 2,2-bis(*p*-chlorophenyl)-1,1,1-trichloroethane (DDT) and of tetraethyl pyrophosphate (TEPP), but only TEPP inhibited cholinesterase (ChE). Improvements in the correlation of symptoms, nervous activity, and ACh levels with ChE were obtained when

nerve cords were homogenized in saline containing ACh, which prevented further inhibition of ChE by TEPP found to be present in blood and nervous tissue. There was a similarity in the distribution of ACh in thoracic nerve cords of roaches after topical treatment with TEPP and DDT but the physiological properties of the blood revealed differences in the mode of action of the two insecticides. The effects of blood from the poisoned insects on the electrical activity of the isolated nerve cord of roaches are discussed in relation to the penetration of the nerve cord by known neurohumors."

PAPADAKIS, A. M. & HOURMOUZIADIS, A. N. **Human Infestation with *Linguatula serrata*. Report of a Case.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Sept., v. 52, No. 5, 454–5.

After briefly reviewing the life history of *Linguatula serrata* and reports of previous infections with this parasite in human beings the authors describe a new case from Eastern Macedonia. The patient was a 29-year-old woman who suddenly developed a coughing and sneezing attack accompanied by allergic symptoms and increased nasal secretion. The symptoms subsided for a few hours and then returned, and for 15 days intermittent attacks occurred. During the attacks worm-like fragments were expelled from the nose and mouth which were subsequently identified as nymphs of *L. serrata*. Bronchoscopy and X-ray examinations of the sinuses, as well as examination of the pharynx and nose, were normal; the blood and faeces were also normal. The husband and child of the patient were in good health and the family's dog also appeared normal; sheep were kept by neighbouring families. Six months after the acute attacks the only remaining symptom was a slight sensation of burning in the pharynx. *E. R. Nye*

HAMMERSTROM, R. J. **Insect Resistance to Insecticides.** *Pub. Health Rep.* Wash. 1958, Dec., v. 73, No. 12, 1126–31. [16 refs.]

In recent years there have been several excellent reviews of the insecticide resistance problem with which readers of this *Bulletin* will be familiar. This account, written primarily for members of state or local health departments in the U.S.A., does not attempt to compete with these in detail but provides a discussion of the more basic issues relevant particularly to those concerned in public health. Resistance is defined from first principles and stress is laid on its significance in the control of insect-borne diseases.

An account is given of the branches of research now being carried out at the Communicable Disease Center, Technical Development Laboratories, Savannah, Georgia. Work is proceeding on (a) the detection and measurement of resistance, (b) biochemical investigations on the degradation of insecticides by resistant strains, (c) aspects of behaviouristic resistance, (d) genetical studies in relation to the acquisition of resistance, (e) the determination of the efficiency of newly developed insecticides. There is mention of the technical assistance available to state and local health departments in the U.S.A. from the Communicable Disease Center's State Aids Section. They run a service to confirm suspected cases of resistance reported to them by local authorities and to advise on the use of new insecticides.

It is stressed that, with the growing importance of resistance to insecticides, emphasis must again be laid on proven methods of prevention and control of insect breeding through sanitation and other environmental measures. Details of certain CDC projects are given. *R. J. Wood*

LONERGAN, R. P. & HALL, L. B. **A Method of predicting the Effect of Nozzle Erosion from Water-Wettable Insecticides on the Discharge Rates of Nozzles.** *Bull. World Health Organization.* Geneva. 1958, v. 19, No. 6, 1073–83, 6 figs.

The erosion of spray nozzles resulting from regular use of wettable powders in malaria control spray campaigns has led to wastage due to overdosing as the nozzle size increases. The authors demonstrate a fairly simple way of predicting the rate of wear, based on considerable experimentation with a particular type of nozzle (Teejet nozzles, giving fan-shaped sprays, made by Spraying Systems Co., of Illinois). They suggest that the applicability of the method should be checked before its direct application to other nozzle types.

The method depends on the empirically deduced relation $y = ct^{\frac{1}{m}}$, where y is the increase in discharge rate (ml. per minute), c the nozzle erosion coefficient, t the total spraying time (hours), and $\frac{1}{m}$ the spraying time exponent. By the nature of this equation, it is possible to plot y against t on log.-log. graph paper and obtain straight lines. For any particular nozzle, it seems, the lines for different spray pressures are parallel and the value of $\frac{1}{m}$ constant (in this case it was equal to 0·551). Thus, having established the slope of these lines, the nozzle wear rate can be predicted from a single run by drawing a line through the observed value, parallel to the general series.

J. R. Busvine

BARLOW, F. & HADAWAY, A. B. **Studies on Aqueous Suspensions of Insecticides. Part VI. Further Notes on the Sorption of Insecticides by Soils.** *Bull. Entom. Res.* 1958, June, v. 49, Pt. 2, 315–331. **Part VII. The Influence of Relative Humidity upon the Sorption of Insecticides by Soils.** *Ibid.*, 333–54, 6 figs.

The authors continue their long series of papers on the behaviour of insecticide residues on mud walls. These two recent papers deal extensively with the phenomenon of sorption into mud by the methods used in earlier papers [see this *Bulletin,* 1953, v. 50, 165; 1956, v. 53, 682]. Most tests were done with blocks of Uganda mud, which is very active in regard to sorption. In general, the same series of events happen with gamma BHC, dieldrin and DDT, but the rate at which they occur falls off in that order. The first process is adsorption off the surface, so that the residues disappear usually in a period of hours (BHC) or days (DDT). Subsequently the insecticide gradually diffuses through the thickness of the block until it is evenly dispersed. This may take only a month with gamma BHC, 6 to 12 months with dieldrin or longer with DDT. After this time, there is loss of gamma BHC by evaporation from the surface, so that in 32 weeks as much as 80% may be gone. There is no appreciable loss of dieldrin at the end of a year. Critical chemical tests show that there is no chemical degradation of gamma BHC or dieldrin,

only physical changes (sorption, diffusion, evaporation). Temperature affects these processes somewhat, but over the range 20° to 30°C. the increased rates are not as great as might be expected.

Humidity has already been shown to have a strong effect on sorption and diffusion of insecticides on dried mud. In the second of the present papers the authors describe more extensive investigations. They show that dried mud sorbs water according to the relative humidity of the air. Up to about 60% RH it probably forms a mono-molecular film ; above that there is rather slower filling of microcapillaries. Uptake from the air is rapid in the lower range, but slows up at high levels. Desorption is always fairly rapid, being complete in under 24 hours.

The effect of the sorbed water is to retard sorption of insecticide and to displace insecticide already sorbed. In practice this means that the initial disappearance of the crystalline deposit is delayed by high humidity. Thus, at 10% RH, dieldrin would disappear in a few hours on active soils and 3 to 4 days on inactive soil and DDT would take a little longer. But at 90% RH, dieldrin would require a minimum of 2 to 3 days and there would be no apparent change in 7 weeks.

Once the insecticides had left the surface, the greater mobility when sorbed water is present would accelerate the distribution of insecticide through the block ; so that instead of a heavy concentration just under the surface, it would be much more deeply spread. These effects could be reversed by moving a block from a high humidity to a low, or *vice versa*.

The practical result of these effects is that the insecticidal activity of deposits on dried mud is greatly increased by high humidity, not because of a greater concentration in the outer layers of the mud, but because of the greater mobility of insecticide which can thus diffuse out and contaminate the insect resting on the surface. These laboratory experiments confirm and explain field observations in house spraying campaigns. *J. R. Busvine*

LABORATORY PROCEDURES

DEVIGNAT, R. **Assistance technique en médecine africaine. Vol. I. Bactériologie, virologie, mycologie, protozoologie, hématologie.** [Medical Technical Assistance in Africa. Vol. I. Bacteriology, Virology, Mycology, Protozoology, Haematology]

This book was reviewed on p. 582.

GUINN, Elizabeth. **The Use of the Zinc Sulfate Centrifugation Flotation Technic as a Routine Diagnostic Procedure.** *Amer. J. Clin. Path.* 1959, Jan., v. 31, No. 1, 87–8, 1 fig.

The author, from the National Institutes of Health, Bethesda, describes a modification of the Faust zinc sulphate flotation technique which has been

found satisfactory for detecting protozoal cysts and worm eggs. The routine also included direct examination of saline and iodine preparation.

A small portion of faeces is placed in a tube containing 3 to 4 ml. of tap water, and after mixing, the tube is filled with water to ¼ inch from the top and centrifuged for one minute at 1600 r.p.m. The supernatant is removed, the sediment mixed by tapping the bottom of the tube, which is then half filled with water and the contents mixed again. Once more the tube is filled to ¼ inch from the top and centrifuged. The washing process described is repeated until the water is clear (3 or 4 times). After the supernatant is finally decanted the specimen will then keep in a refrigerator for a week.

To the mixed sediment is added zinc sulphate (S.G. 1180) to ¼ inch from the top of the tube, which is centrifuged once more. The meniscus is touched with a wire loop to obtain the specimen. Alternate loopfuls are placed without delay at each end of a slide until there are 4 or 5 at each end. One end is examined in saline and the other in iodine, under coverslips. Each slide should have at least 10 minutes' systematic examination. Five specimens (1 every other day) should be aimed at.

The author examined specimens from 865 patients who submitted at least 3 specimens each. Of the 202 (23%) showing intestinal parasites by this method 70% were positive at the first examination, but when 5 specimens were examined the efficiency of the test was almost 100%.

A figure showing the results of examining 1 to 5 specimens in patients harbouring, respectively, *E. histolytica, Giardia* and *Trichuris,* demonstrates clearly the value of examining multiple specimens. *H. J. O'D. Burke-Gaffney*

MISCELLANEOUS PAPERS

ROYAL SOC. PROMOTION HEALTH J. 1958, Sept.–Oct., v. 78, No. 5, 679–81. **Health Congress at Eastbourne, Apr. 28–May 2, 1958. Tropical Hygiene Section. Presidential Address** [KILPATRICK, J.].

This address deals with the changing outlook on tropical hygiene which formerly was a matter of technology and with little scope for an academic approach. The principles of hygiene, however, differ little in their application, whether the locality is tropical or otherwise, action being conditioned by the climatic environment, the social, educational and economic status of the people, their occupation and prevalent diseases. In the past tropical hygiene has been primarily concerned with the last factor, but now it should be coordinated into a wide strategic plan over a broader front. Principles, rather than technology, have become the driving force. The needs of the population can now be seen as a whole and action can be coordinated within a balanced plan.

T. H. Davey

REPORTS AND SURVEYS

COLONIAL OFFICE. **Colonial Research 1957–1958. Tsetse Fly and Trypanosomiasis Committee. Report for 1957–1958** [MONSON, W. B. L., Chairman] (pp. 306–21). Cmnd. 591. 347 pp. 1958, Nov. London: H.M. Stationery Office. [14s. 6d.]

This Committee was particularly concerned with the activities of the Trypanosomiasis Research Units in East and West Africa, and attention was primarily concentrated on the chemoprophylaxis and therapy of cattle trypanosomiasis. Research on the sterilization of tsetse flies by gamma rays has been completed.

The hospital unit set up by the East African organization has been functioning for 15 months and 148 new and 11 relapsed patients have been treated. Several clinical studies are in hand. Most of the patients are infected with *Trypanosoma rhodesiense* which on the shores of Lake Victoria is replacing *T. gambiense* in the same places and occupations.

The trypanosome challenge in cattle trypanosomiasis is being studied by comparing different methods of collecting *Glossina pallidipes*. Experiments in prophylaxis by combining drugs with artificial infection with *T. congolense* have had promising results. In protozoological research trypanosomes have remained apparently unchanged for up to 7 months when deep-frozen, and oxygen consumption of various strains has shown wide differences. No special developmental stage has been found in the mammalian host and changes of form are probably reactions to the protective mechanism of the host. Estimations of fly populations have been made and in the Lambwe Valley it is estimated that there are probably over 3,000,000 *G. pallidipes* per square mile. Further identifications of blood meals in *G. swynnertoni* and *G. pallidipes* confirm wild pigs as the main source; the proportion is higher than the numbers of these hosts would warrant and this requires explanation. Studies of water loss and of fat metabolism suggest that these may affect fly distribution.

The West African Institute reports probably the best year of its existence. The difficulty of infecting *G. palpalis* has been reduced by feeding on the first day of life. Studies of the local reaction at the site of the bite indicate that the trypanosomes multiply here and change into the blood forms. Investigation of cyclical changes in the blood forms shows that the slender forms are associated with increase in numbers and the stumpy forms with decrease, the latter probably being a reaction to the host's defence mechanism. Drug trials were made with Berenil in 17 patients; it was well tolerated and all but one appeared cured a year later.

Failure to isolate field strains of *T. congolense* was caused by low pathogenicity for sheep. A *T. congolense*-like trypanosome recently encountered was fairly acutely pathogenic and was longer than normal *T. congolense*; it is probably *T. dimorphon*. The rate of infection of *G. morsitans* in the laboratory can be raised to almost 35% by maintenance at suitable temperatures. Studies on the suramin complexes were continued. The severe reactions in cattle to these preparations reported last year [this *Bulletin*, 1958, v. 55, 602] were investigated. Dehydration of the suramin, more concentrated solutions of the drug and intramuscular injections reduced the reaction but this last was associated with serious delayed general toxicity. Further investigation of subcutaneous use of the ethidium bromide-suramin complex is being made.

Studies of the West African forest tsetse continue. Marked *G. tabaniformis* and *G. fusca* were recaptured up to 1½ miles from the release point, 2·2% were taken 18 or more days and one fly 80 days after release. Identification of blood meals revealed Red River-hog and porcupine as hosts of *G. tabaniformis* and bush-buck of *G. longipalpis*. Marked *G. palpalis* were found restricted to rivers in the arid north but dispersed in the humid south; the former greatly facilitates contact with man and hence the occurrence of sleeping sickness.

Valuable work also was done by the territorial departments—in testing new drugs in West Africa, in tsetse survey and control with dieldrin emulsion in Northern Rhodesia, where also field and laboratory trials of drugs for cattle trypanosomiasis have been carried on. Dieldrex 15 sprayed from the air appears to have eliminated *G. palpalis* from 300 miles of 2 river systems in Nyanza, Kenya. Blood meal identifications from *G. longipennis* reveal rhinoceros as its preferred host. Attractants for *G. pallidipes* were tested but only ethyl caprate was attractive, and lanolin and shark extract to a lesser extent.

This report indicates the great variety of subjects being studied in British tropical African territories in connexion with trypanosomiasis control, and the considerable advances in knowledge. *T. H. Davey*

KOBLENZER, P. J. **The Health of the Rungus Dusun of British North Borneo.** *J. Trop. Med. & Hyg.* 1958, Dec., v. 61, No. 12, 293–302, 4 figs. [24 refs.]

This interesting paper describes the health of a primitive pagan, agricultural people inhabiting mainly the Kudat Peninsula of North Borneo. They live in traditional wood and thatch longhouses of up to 30 rooms raised 10 feet or so from the ground and holding 100 to 200 people. Standards of living and hygiene are low. The diet consists almost entirely of rice, yielding some 2,800 calories daily, to which are added salt and the tops of fern leaves as vegetables. Very occasionally a little dried fish or some banana or pomelo is eaten. Protein malnutrition is, nevertheless, uncommon.

In one village 185 persons were examined. Records were made of approximate age, height, weight, vision, Mantoux and Kahn tests, blood and stool examinations. The average height of males was 5 feet 1 inch and of females 4 feet 9 inches, average weights being 108 and 95 lb., respectively. Positive Mantoux reactions were found in 38%, with the majority of the population converting in the third decade. 2 cases of active tuberculosis with cavitation were found by X-ray examination. Malaria, as determined by spleen examination, was hyperendemic and the vector is *Anopheles leucosphyrus*. Haemoglobin levels were somewhat low and in females fell after the onset of menstruation, possibly because of marginal iron intake. Hypochromic anaemia was widespread; sicklaemia appeared to be absent. Clinical yaws has been much less prevalent since a campaign in 1952 but 61% of Kahn tests were positive and venereal treponematosis was absent. Neutralization tests for poliomyelitis showed antibodies in more than half the population against the three types. Helminth ova were present in 84% of stools, *Ascaris* being the most common parasite. No *Entamoeba histolytica* were found in 161 fresh stools. *T. H. Davey*

WADHAM, B. McM. **Manus Island.** *J. Roy. Nav. Med. Serv.* 1958, v. 44, No. 4, 261–5, 1 fig.

Manus Island, situated 250 miles north of Lae on the north coast of New Guinea, is one of the Admiralty group of islands which are included in the United Nations trust territories administered by Australia. Though it lies only 100 miles south of the Equator, its climate is equable, with a temperature range between 75°F. and 95°F., and an annual rainfall of 130 inches distributed between November and March. The island is forested and mountainous, rising to 2,500 feet.

The Royal Australian Navy maintains a permanent establishment on Lombrum Point, which extends into a sheltered harbour named Seeadler. The station is thus pleasantly situated and has excellent living quarters and recreational facilities. On the same island there is a civil administrative centre, a military aerodrome, and a military station housing a Company of the Pacific Islands Regiment.

Two medical officers of the R.A.N. staff a small European hospital of 16 beds and a native hospital of 20 beds, and have a close liaison with the civil medical service which maintains a 200-bed hospital for the 10,000 Melanesian inhabitants of the Admiralty Islands.

Endemic diseases include malaria, yaws, filariasis, leprosy and tinea imbricata. Among the intruding European population " tropical ulcer " is liable to follow minor abrasions on the legs, while otitis externa is frequent; occasional cases of malaria are seen among those who evade routine prophylaxis. It is interesting to note that the standard malarial prophylactic in the Royal Australian Navy is amodiaquine, of which 3 tablets (450 mgm. of base) is given once weekly. This appears highly efficient. The Royal Australian Air Force uses chloroquine (150 mgm. of base) thrice weekly. *J. H. Walters*

BOOK REVIEW

HALSTEAD, Bruce W. [M.D.] **Dangerous Marine Animals.** pp. ix + 146, coloured frontispiece & 86 figs. 1959. Cambridge: Cornell Maritime Press, Maryland, U.S.A. London: Putnam & Co., Ltd., 42, Great Russell Street, W.C.1. [$4.00; 30s.]

This book has been written for the information of everyone connected with marine life, from skin divers and shell collectors to physicians and explorers, and with such a wide appeal, some unevenness is inevitable, but the physician will find much to interest him concerning the medical aspects of the injurious effects produced by the creatures described.

Some conditions, such as the bites of large fish, are purely traumatic, and their management depends upon well-known surgical principles. Preventive measures against these are addressed chiefly to the bather himself, and sometimes presume an unusual strength of body and character, as in the admonition " It may be necessary to shove the shark away . . .". The voracious *piraña*

of South American rivers, vividly described in *Exploration Fawcett,* is not mentioned.

The chief medical appeal of the book is to tropical practitioners who are likely to encounter the effects of poisonous stings inflicted by a large variety of fish, many of which are found only in tropical waters. The medical aspects of sea-snakes (rather strangely included under Marine Animals that Sting), are well described, and the treatment section includes first-aid measures and details with regard to the subsequent management of patients in hospital. The chapter on marine animals that are poisonous to eat contains much valuable information, although one is left with the impression that very few tropical fish are entirely dependable as food, especially since a poisonous individual cannot be distinguished from others of the same species either by appearance or simple chemical tests.

The author confidently gives the generic and specific names of each animal mentioned, and both names are indexed, which seems a little unnecessary. The book is lavishly illustrated and the diagrams by Kreusinger in particular are excellent examples of taxonomic illustration. Although it has some aspects of a work of reference, the vitality of the writing greatly adds to its interest and carries the reader along, notwithstanding one or two unhappy phrases such as ". . . etc. ad infinitum". The book is in clear type and the illustrations are well produced. In all, the publishers have put together a very pleasing and creditable volume, although the price may place it beyond the reach of some of those for whom it is intended. *A. J. Duggan*

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